METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Meteorological and geoastrophysical abstracts //

Volume 11, 1960

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 45 Beacon Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

TABLE OF CONTENTS

Vol. 11, 1960

Vol. Number	1960 Month	Part I Current Abstracts		Part II Selective Bibliographies		Part III Journal Contents
		page	item number	page	item number	pages
1	Jan.	1	11.1–1 to 11.1–318	101	11A–1 to 11A–143	144–161
2	Feb.	177	11.2–1 to 11.2–302	265	11B–1 to 11B–162	320–334
3	March	349	11.3–1 to 11.3–228	415	11C–1 to 11C–211	467–485
4	April	497	11.4–1 to 11.4–304	584	11D–1 to 11D–162	621–638
5	May	653	11.5–1 to 11.5–332	742	11E–1 to 11E–172	783–807
6	June	821	11.6–1 to 11.6–372	928	11F–1 to 11F–160	968–992
7	July	1009	11.7–1 to 11.7–399	1129	11G–1 to 11G–194	1175–1187
8	Aug.	1205	11.8–1 to 11.8–334	1307	11H–1 to 11H–166	1346–1365
9	Sept.	1381	11.9–1 to 11.9–336	1480	11I–1 to 11I–201	1536–1552
10	Oct.	1569	11.10–1 to 11.10–388	1683	11J–1 to 11J–201	1730–1741
11	Nov.	1775	11.11–1 to 11.11–283	1845	11K–1 to 11K–142	1878–1900
12	Dec.	1913	11.12–1 to 11.12–600	2083	11L–1 to 11L–400	—
12	Dec. (Pt. III)		Supplementary Issue	2181	11M–1 to 11M–1295	—
	Jan.–Dec.	2417	Author and Subject Indexes			

SELECTED ANNOTATED BIBLIOGRAPHIES

	Title	1960	page
11A	Outstanding Reference Works of the Past Decade	Jan.	101
11B	Outstanding Text and Technical Books of the Past Decade	Feb.	265
11C	Numerical Forecasting (Second Supplement)	March	415
11D	Ionospheric Physics	April	584
11E	Ionospheric Radio Propagation	May	742
11F	Ionosphere	June	928
11G	Forecast Verification	July	1129
11H	Radar Meteorology	Aug.	1307
11I	Rocket	Sept.	1480
11J	The Use of Satellites in Meteorology	Oct.	1683
11K	Night Airglow	Nov.	1845
11L	Astronomy and Astrophysics	Dec.	2083
11M	Weather Modification	Dec.	2181

AMERICAN METEOROLOGICAL SOCIETY

QC
851
A62
1960
July-Dec.
M/C

UNIVERSITY OF ILLINOIS
LIBRARY
FEB 1 1961
CHICAGO

Meteorological & Geoastrophysical ABSTRACTS

Vol. 11 JULY 1960 No. 7

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

**Editor and Supervisor:* MALCOLM RIGBY (Washington)
#*Business Manager:* KENNETH C. SPENGLER (Boston)
Corresponding Editor: *DR. ANDRE VANDENPLAS (Uccle, Belgium)
Corresponding Analyst: *DR. I. L. DORDICK (Chicago, Ill.)

EDITORIAL STAFF (Washington)

Assistant Editor (Publications): MARY L. RICE
Chief Bibliographer (Accessions): GEZA THURONYI
Chief Cataloger: DOROTHY M. GROPP
Chief Indexer: *MARINA SZE

Bibliography

ELEMER KISS
ANDREW J. MEGLIS
OTTO TABORSKY

Cataloging

*BEVERLY HUGHES
*BARBARA H. KING
*MARGARET MATTHEWS
*SHIRLEY PANARA
*LAURA I. PETERSON

Abstracting

EVELYN Z. SINHA
KIWON CHUNG
AHMED KHAN
NNDEM E. U. NNDEM
WILHELM NUPEN
*ALEXIS M. POUSHKIN
ISMAIL SAAD

Indexing

*MURIEL F. HAAS
*WINIFRED SCHRAITLE
*MARY B. DENNY
*SUSAN MANOVILL
*HELEN THURONYI
*RUSSELL G. CADY

Processing

*EDITH N. HAUPT
*DORIS G. NICKEY
*MILDRED CARROLL
*KATHERINE MARTINOFF
*HELEN I. RICKELS

* Part time.

EDITORIAL OFFICE: Washington, D. C. **P.O. ADDRESS: Box 1736, Washington 13, D. C. Telephone: REpublic 7–6278.

#**ADMINISTRATIVE OFFICE: American Meteorological Society,** Office of Executive Secretary, 45 Beacon Street, Boston 8, Mass.

Address all business communications, orders and inquiries to the Executive Secretary, Mr. Kenneth C. Spengler, 45 Beacon Street, Boston 8, Mass. Exchanges and reprints may be sent direct to P. O. Box 1736, Washington 13, D. C.

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS is a monthly publication devoted to:

A. Current Abstracts in English on important meteorological and geoastrophysical literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists, geophysicists and astrophysicists.

SUBSCRIPTION RATE: $60 ($15.00 per year to members). Prices for single copies $10 ($5 to members); back issues $6 ($3 to members); back volumes $30 ($15 to members); Vol. 1–10 complete, $200 ($100 to members).

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

MALCOLM RIGBY, Editor

Vol. 11 JULY 1960 No. 7

Supported by
DEPARTMENT OF THE AIR FORCE
DEPARTMENT OF THE ARMY
DEPARTMENT OF THE NAVY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
NATIONAL SCIENCE FOUNDATION
UNITED STATES WEATHER BUREAU

Special Feature in This Issue

Bibliography on Forecast Verification
By
Andrew J. Meglis

(*For table of contents see back cover*)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 45 Beacon Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

FOREWORD

Meteorological and Geoastrophysical Abstracts is a monthly publication whose purpose is to bring to the attention of meteorologists, geophysicists and astrophysicists current literature in their field.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution 2. Aerobiology 3. Cloud Physics 4. Hail
5. Tornadoes 6. Volcanic Dust 7. Climat. Changes 8. Thunderstorms
9. Icing 10. Acoust. Propagation 11. Evaporation

Vol. II, 1951

1. Extended Forecast. 2. Long Range Forecast. 3. Soil Temp. 4. Constants, etc.
5. Clim. of Near East 6. Clim. of Middle East 7. Special Winds 8. Radar Storm
9. Condensation Trails 10. Clim. of N. E. Africa 11. Mountain Met. Detect.

Vol. III, 1952

1. Clim. of N. W. Africa 2. Carbon Dioxide 3. Clim. of Argentina, etc. 4. Dew
5. Objective Forecast. 6. Stratus Forecast. 7. Urban Climatology 8. Clim. of C. Africa
9. Visibility 10. Glaze and Rime 11. Free Air Turbulence

Vol. IV, 1953

1. Turbulence Theory 2. Turbulent Diffusion 3. Frost 4. Clim. of Australia, etc.
5. High Level Winds 6. Winds in Stratosphere 7. Jet Stream 8. Radiation Bioclim.
9. Clim. of Pacific 10. Auroras 11. Sferics

Vol. V. 1954

1. Oceanog. Met. 2. Clim. of S. E. Asia 3. Auroral Physics 4. Tropopause
5. Balloons 6. Numerical Forecast. 7. Radiation Data 8. Vertical Motion
9. Clim. of Arctic 10. Industrial Met. 11. Wind Waves and Swell

Vol. VI, 1955

1. Bibliog. of Bibliog. 2. Texts & Monogr. Bibliogs. 3. Storm Surges
4. Ionospheric Prop. 5. Photochem.—Upper Atmos. 6. Cloud Physics
7. Radar Cloud Physics 8–9. Atmos. Nuclei 10. Weather Modification 11. Cooling Power

Vol. VII, 1956

1. Synoptic Met.-Arctic 2. Clim. of Enclosed Spaces 3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56) 5. Atmos. Radioactivity 6. Inversions
7. Snow Micromet. 8. Snow Micromet. (Suppl.) 9–11. Tropical Cyclones

Vol. VIII, 1957

1. Solar Weather Relations 2. Night Airglow 3. Forecasting Special Elements
4. Forest Micrometeorology 5. Hydromet. Forecasting 6. Numerical Forecast. (Suppl.)
7. Albedo 8. Meteors 9–10. Tropospheric Prop. 11. Medical Meteorology

Vol. IX, 1958

1. Radioastronomy 2. Solar Astrophysics 3. Radioactivity in Atmosphere
4. Waves and Currents 5. Physical Oceanog. 6. Dynamic & Phys. Oceanog.
7. Long Range Forecast. 8. Radar Met. 9. Cosmic Rays 10–11. Geomagnetism

Vol. X, 1959

1. Works of C. E. P. Brooks 2. Tornado Forecasting 3. Soil Moisture 4. Sferics
5–6. Ozone 7. Acoustic Waves 8. Evaporation Measurement
9. Evapotranspiration (–1955) 10. Evapotranspiration (1956–1959) 11. Evaporation

Vol. XI, 1960

1. Outstanding Reference Works 2. Outstanding Texts 3. Numerical Forecast. (Suppl.)
4. Ionospheric Physics 5. Ionospheric Propagation 6. Ionosphere
7. Forecast Verification

Other bibliographies in preparation are:

Airglow *High Atmosphere Temperatures* *Rocket Meteorology*
Aurora *Radar Meteorology* *Satellite Meteorology*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U S. National Library of Medicine, Washington, D. C.
DSI:	Smithsonian Institution, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.
Ⓢ	after an abstract indicates an abstract prepared for NASA.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet using a modification of the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

A. GENERAL

1. MAJOR WORKS—TEXTBOOKS

See also: **Hist. of U. S. Air Force,** 11.7–55; **Fire weather investigations** (Countryman, Schroeder), 11.7–100; **Tropical hygiene texts** (Rodenwaldt), 11.7–108; **Advances in astronautics,** 11.7–167, **Geomorphology of the Lower Volga** (Gorelov), 11.7–177; **Geomorphology texts** (Maull), 11.7–178; **Oceanog. texts** (Rouch), 11.7–179; **Hydrol. texts** (Todd), 11.7–205; **Hydrol. texts** (Wisler, Brater), 11.7–206; **Hydrol. research,** 11.7–207; **Hydrol. yearbooks,** 11.7–208; **Bog science texts** (Ivanov), 11.7–215; **Ground water, Animas Valley, N. Mex.** (Reeder), 11.7–219; **River runoff data, Romania,** 11.7–220; **River snow survey data,** 11.7–221; **Mesomet. analysis of atmos. phenomena,** 11.7–264; **Hurricane statistics** (Cry et al.), 11.7–283; **Stratospheric-tropospheric flow relationships** (Panofsky), 11.7–326; **Reptile ecology** (Saint-Girons, Saint Girons), 11.7–385; **Thunderstorm elec.,** 11.7–397.

11.7–1 550.3:52:55(082)

†Encyclopédie Française, **Le ciel et la terre.** [Heaven and earth.] (Vol. 3 of the Encyclopedia.) Paris, Larousse, **1956.** Pub. under the direction of A. Danjon, P. Pruvost and J. Blache. 452 p. 335 figs. and plates, tables, eqs. Price: francs 7450. Review in *Ciel et Terre,* Brussels, 73(3/4):226–227, March/April **1957.**—An outstanding group of French scientists collaborated to publish this work of 24 chapters, which actually constitutes an encyclopedia on astronomical, geophysical and geological sciences. Composition and presentation are of an incomparable scientific exactness: each particular problem has been treated by prominent specialists. The first part, entitled **The Heaven** is devoted to a description of the status of our knowledge on the structure of the universe, increased considerably since large, up-to-date telescopes have been put into service. This part, based on the most recent physical theories and techniques, is subdivided into four sections entitled: the earth and the solar system; sun and stars; galaxies; and problems of evolution. The second part of this work is subdivided into 3 sections: the earth's globe; the earth's crust; and evolution of the earth's relief. The first section deals with all the great problems of geophysics, meteorology, atmosphere, auroras, night sky, ionosphere, earth magnetism, earth and ocean tides, gravimetry, isostasy, seismology and physics of the earth's interior. Classical results are briefly reviewed, but recent discoveries are extensively developed. The second section, devoted to geology, shows the successive faces of the earth and their slow evolution. The third section relates to the face of the earth: atmosphere and climates, seas and their dynamics, main features of the planetary oceanic circulation, inland waters (subterranean waters, lakes, rivers, floods), the earth's relief and the evolution of relief in connection with climatic variations. A biobibliographic author index, a methodical table of contents and lists of bibliographic references, classified by subject, are added to the work. *Subject Headings:* **1. Astronomy 2. Astrophysics 3. Geophysics 4. Encyclopedias. I. Danjon, A. (ed.) II. Pruvost, P. III. Blache, J.**—*A. V.*

11.7–2 551.584.7(572)

*†Gorshenin, Konstantin Pavlovich, **Pochvy iuzhnoĭ chasti Sibiri (ot Urala do Baĭkala).** [Soils of southern Siberia, from the Urals to Lake Baikal.] Moscow, Akademiia Nauk SSSR, **1955.** 592 p. figs. and photos, 257 tables, bibliog. p. 587–590. **DLC** (S599.S5G6)—Soil history and conditions for the western Siberian Plains and for central Siberia are treated in detail in the first part (p. 1–106) of this large volume. Climatic conditions of the two regions are discussed briefly on p. 40–44 and 65–69, respectively. Evaluation of the loess and other soils of Siberia, and classification of soils, are then discussed. In Pt. II (p. 107–566), the soils

of southern Siberia are treated under heads: Taiga zone, taiga-forest-steppe zone, forest-steppe zone, steppe and desert-steppe zones. Pt. III gives the details of the soil zones and regions of southern Siberia in outline form. Extensive tables give field data for various regions (soil physics and chemistry, soil moisture, soil temperature, etc.). *Subject Headings:* **1. Soil climates in Siberia 2. Siberia.**—*M.R.*

11.7–3 681.14:621.38

†Korn, Granino Arthur and Korn, Theresa M., **Electronic analog computers (D-c analog computers).** N. Y., McGraw-Hill, **1952.** 378 p. numerous figs. (incl. photos.), refs. throughout, bibliography p. 369–372, eqs. **DWB**—A systematic textbook presenting the theoretical basis of D-c analog computers, their construction, design and application to practical problems. Ch. I considers briefly the application of computing devices, the mathematical relations involved, and the techniques used; Ch. 2 presents a simple, standard procedure for setting up a D-c analog computer to solve a given set of differential equations; Ch. 3 presents computer set-ups for a number of practical problems; Chs. 4–6 describe the design of electronic computing elements for maximum accuracy including the design of networks and feedback circuits used to perform various mathematical operations, the design and operation of modern amplifier circuits for computer applications and developments on the fields of analog multiplication and function generation; Ch. 7 describes the design of auxiliary components and Ch. 8 discusses the design and construction of complete computer installations in industry and science. *Subject Heading:* **1. Electronic computers.**—*I.L.D.*

11.7–4 551.583.2/3(55)

Ghirshman, Roman, **L'Iran: des origines à l'Islam.** [Iran: from its origin to Islam.] Paris, Payot, **1951.** 330 p. 108 figs., 16 plates. (*Bibliothèque Historique.*) **DLC** (DS275.G48). Transl. into English London, Harmondsworth, **1954,** under title **Iran: from the earliest times to the Islamic conquest.** 368 p. 48 plates, 108 figs. Price: 5 sh.; *.95. (Pelican Book.) Review of English ed. in *Weather*, 11(4):131, April **1956.**—A number of references to the prehistoric and historic climates of Iran and their effect on the vegetation, civilization, etc. from the dawn of history to date, are found in Ch. 1 and 2 of this remarkable book on archaeology and geography of Iran. *Subject Headings:* **1. Climatic changes in Iran 2. Geography of Iran 3. Iran.**—*M.R.*

11.7–5 551.578.46:656.1/5(02)

†Eventov, I. M., **Snegoochistiteli.** [Snowplows.] Moscow, Gosud. Naucho-Tekhn. Izdat., **1954.** 142 p. 85 figs., 26 tables, 28 refs., 89 eqs. **DLC**—Designs, operation and methods of calculating the efficiency and power of snow removal machines (both plough and rotary) used on Soviet highways are described and discussed in this book intended for road technicians, builders and operators of snowplows. The text is illustrated with numerous drawings, graphs and tables. Ch. I deals briefly with the physical and mechanical properties of freshly fallen snow and of snow cover and contains a classification of snow cover. *Subject Headings:* **1. Snow removal 2. Snow cover 3. U.S.S.R.**—*A.M.P.*

11.7–6 551.58:63(02)

Advances in Agronomy, Vol. 10, **1958.** Prepared under the auspices of the American Society of Agronomy. Ed. by A. G. Norman. Issued N. Y., Academic Press, **1958.** 547 p. figs., tables, refs. Articles of interest, abstracted separately: Olson, R. V., **The Great Plains area,** p. 3–8. Hide, J. S., **Soil moisture conservation,** p. 23–36. Stephens, C. G. and Donald, C. M., **Australian soils and their responses to fertilizers,** p. 168–256. **DWB** (630.72 A244ad)—A book containing a collection of 11 major articles on climate, soils, fertilizers and specific agronomy crops (grasses, legumes, safflower, castor beans), some of which are used for soil moisture or fertility conservation in the Great Plains (U. S.), Australia, etc. Results of experiments made in these areas on soil moisture and fertility, conservation as related to temperature, precipitation, cover, rainfall amount, etc., are cited. *Subject Headings:* **1. Agricultural climatology 2. Agronomy textbooks. I. Norman, A. G.** (*ed.*).—*M.R.*

11.7–7 551.58(02) 551.582.1(560)

*†Ering, Sirri (*Geog. Inst. of Istanbul Univ.*), **Tatbiki klimatologji ve Türkiyenin iklim şartlari.** [Practical climatology and Turkish climatic conditions.] *Istanbul. Teknik Universitesi Hidrojeoloji Enstitüsü, Yayinlari*, No. 2, **1957.** 252 p. 89 figs., 7 maps (fold.), 27 tables, bibliog. p. 221–225. **DWB** (M82.1/56 E68ta), **DLC** (QC990.T783E7)—A fairly comprehensive textbook on the various aspects of climatology including statistical methods, computation of special elements important for agriculture or hydrology, the climate of the earth, and local climatology of Turkey. Many graphs and tables are included along the charts showing variation of the main elements throughout Turkey and of such factors as evapotranspiration, drought, etc. A good list of references to material on the climate of Turkey (as well as on general climatology) is appended along with tables of climatic data for selected stations in Turkey and a subject index. *Subject Headings:* **1. Climatology textbooks 2. Climatology of Turkey 3. Turkey.**—*M.R.*

11.7–8 53(02)

†Kronig, Ralph de Laer; De Boer, J. et al. (*eds.*), **Leerboek der Natuurkunde.** [Textbook of physics.] Amsterdam, Scheltema and Holkema, **1958.** 891 p. numerous figs., tables and eqs., bibliog. p. 844–874. Also 2d rev. English ed., as **Textbook of Physics,** issued London, Pergamon Press, **1959. DLC** (QC21.K713 1959)—A well developed and modern textbook, written with the collaboration of eminent Dutch physicists. The work, of university level, is particularly indicated for chemists, biologists and physicists. The introduction, by R. KRONIG, develops the objectives and methods of physics and also describes the mathematical resources in physics. VAN DER LEEDEN treats of the science of mechanics in all aspects and also of wave and vibration theories. The chapter on electricity is developed by G. J. SIZOO. P. H. VAN CITTERT gives an insight into optical physics; R. KRONIG describes atomic composition and C. J. GORTER develops atomic electricity. Thermodynamics are described by J. DE BOER in a chapter treating of the two most important laws in thermodynamics, the characteristic functions, equilibrium and the law of NERNST. Electrical equipment is developed by C. J. GORTER and J. B. WESTERDIJK; optical equipment by A. C. S. VAN HEEL. A chapter on medical physics is written by H. C. BURYER. The work also includes a series of biographical notes and ends with a nomenclature by J. KORRINGA. *Subject Heading:* **1. Physics textbooks.** —*A.V.*

11.7–9 551.5:91(02)

Zinkiewicz, Wlodzimierz, **Meteorologia dla geografów.** [Meteorology and geography.] Lódoź, Państwowe Wydawn. Naukowe, **1955.** 109 p. At head of title: Skrypty dla szkól wyższych. Uniwersytet Marii Curie-Skłodowskiej w Lublinie. **DLC** (QC863.Z52)—A brief course in the basic principles of meteorology (atmospheric physics and synoptic meteorology) with schematic diagrams illustrating some of the processes. *Subject Headings:* **1. General meteorology for geographers 2. Elementary meteorology textbooks.**—*M.R.*

11.7–10 551.556.3:621.311.24:621.548(02)

*†Fateev, E. M., **Vetrodvigateli i vetroustanovki.** [Wind mills and wind installations.] Moscow, Gos. Izdat. Sel'skokhoziaĭstvennoĭ Literatury, **1948.** 543 p. 342 figs., 48 tables, 58 refs. **DLC** (TJ825.F38)—This large text contains the basic aerodynamic theory and engineering details of wind power, wind machines (windmills) and wind utilization. Many nomograms and useful tables for wind energy computations as well as line drawings and simple photographs of various types of equipment are included, and applications to agriculture are stressed. The 17 chapters are divided into two sections: Pt. 1, windmills (theory, experimental basis, systems, ideal and actual wind forces, experimental windmills; construction in the field, regulation and efficiency). Pt. 2, wind power equipment (wind energy anemometry, characteristics of wind gustiness, profiles, accumulation of wind energy, wind pumps, windmills for grain, wind power stations (electric) and construction of wind stations). *Subject Headings:* **1. Wind machine textbooks 2. Wind power utilization 3. Aerodynamics 4. Anemometers.** —*M.R.*

11.7–11 551.5(02) 551.58(02)

†Milone, Ferdinando, **Lezioni di geografia economica.** [Lessons in economic geography.] Naples, M. Fiorentino (**1948?**). 223 p. figs., bibliog at end of each part. Contents: **Pt. 1, La terra quale astro errante,** p. 7–87. **Pt. 2, Il clima,** p. 89–223. **DLC** (QC863.M5)—The 11 chapters give philosophical, historical and classical scientific information on the universe, solar system, season, earth and its shape, climate, atmospheric pressure and air circulation, precipitation, and climate and man and vegetation (climatic classification). The text is in lecture form, accompanied by illustrative tables, world charts of temperature, precipitation, star and schematic diagrams. In the appended bibliography a number of references are given to standard literature on meteorology and climatology (through 1945). *Subject Headings:* **1. Meteorology textbooks 2. Climatology textbooks.**—*M.R.*

11.7–12 551.585

*†Ivanov, Nikolaĭ Nikolaevich, **Landshaftno-klimaticheskie zony zemnogo shara.** [Landscape-climate zones of the world.] *Vsesoiuznoe Geograficheskoe Obshchestvo SSSR, Zapiska,* n. s., Vol. 1, **1948.** 223 p. 44 tables+tables in appendix, 168 refs. At head of t-p.: Akademiia Nauk SSSR. Geograficheskoe Obshchestvo SSSR. **DLC** (QC981.I84)—The author has developed a climatic classification of the world based on landscape types, and presents in this monograph a tremendous amount of data and charts of the continents on which the various types are delineated. The basic types are: T) Tropical; S) Subtropical; O) Oceanic; M) Warm temperate; U) Cold temperate; X) Cold; K) Dry continental; P) Tundra; A) Arctic. Considerable emphasis is placed on the uneven distribution of precipitation and on various precipitation regimes, on snow and on the moisture coefficient. Various climatic classification systems are outlined in the first chapter. The system used by the author includes subscripts for moisture zones: V = coefficient of moisture $\geqslant 1.50$ (excess moisture or rain forest); D = 1.00–1.49 (sufficient moisture or forest zone); Y = 0.60–0.99 (moderated humid or forest steppe zone); S = 0.30–0.59 (deficient moisture or steppe zone); P = 0.13–0.29 (scanty moisture or semi-desert); and A = 0.12 to 0.00 (traces of moisture or desert zone). Another factor in the classification is the annual moisture regime, which is indicated by 8-letter symbols and on maps by appropriate cartographic symbols—e.g., *P* = region without dry season; Z = dry tropical winter (1–6 mo K < 0.60); Z′ = dry tropical winter (> 3 mo K < 0.30); S = mediterranean type with dry summer; M = dry and cold winter. Also indicated on charts are mean temperatures of coldest and of warmest months. A chapter is also included on evaporation, its distribution over the earth and in various seasons, with extensive tables of monthly evaporation for scores of stations by general regions of the earth, and a discussion of peculiarities of various regions. *Subject Headings:* **1. Climatic classification of world 2. Landscape-climate classification 3. Ivanov's climatic classification 4. Soil moisture coefficients 5. Evaporation over earth.** —*M.R.*

11.7–13 551.4:551.582.2(4)(02)

†Dobrynin, Boris Fedorovich, **Fizicheskaia geografiia Zapadnoĭ Evropy.** [Physical geography of Western Europe.] Moscow, Uchpedgiz, **1948.** 416 p. 220 figs. (incl. photos, diagrs., maps (some fold.)+9 maps in color in pocket, 165 refs. Index to geographical names. Price: 22 rub. 50 kop. **DLC**—On p. 39–53 is found a general description of the climate of Europe as represented by prevailing air flow, pressure centers, average winter and summer temperature, precipitation, snow and typical synoptic weather situations; all illustrated with charts. Then under the various regions of Europe (such as the Balkans, Carpathians, Alps, France, German Lowlands, Great Britain, Scandinavia, etc.) there are brief descriptions of the climate as well as hydrology, soils and vegetation of the region. These descriptions are accompanied by charts of precipitation or snow for the specific region. *Subject Headings:* **1. Climate of Europe 2. Regional climatology 3. Physical geography textbooks 4. Europe.** —*M.R.*

2. HANDBOOKS—MANUALS

11.7–14 551.509.5(02)

§U. S. Bureau of Aeronautics (Navy), **Interim trajectory forecasting manual.** Project AROWA (TED-UNL-MA-501.19), [Unnumbered Research Report], March **1956.** 33 p.

+appendices. 2 figs.+folded charts, 4 refs. **DWB** (M07.32 U58L)—A manual for 36 and 60 hr forecasting of trajectories at 300 mb based on experience in the Pacific with transosonde balloons. Appended are numerous examples of transosonde trajectory calculations for actual synoptic situations over the U. S. in May 1953. Many useful nomograms and diagrams are included. *Subject Headings:* **1. Trajectory forecasting manuals 2. Transosonde trajectories 3. 300 mb trajectories 4. United States 5. Eastern Pacific.**—*M.R.*

11.7–15 551.509.1(02)

U. S. Air Weather Service, **Weather message contents handbook.** Its *AWS Manual*, 105-2, Pt. 2, Jan. **1957.** Each section repaged. Included in same binder, **Revisions,** No. 1–6, dated Jan. 4–Oct. 10, **1957.** Forms. "Supersedes *AWS Manual* 105-2, Pt. 2, Dec. 1, 1955." **DWB** (M055 U58am)—Extensive detailed manual outlining contents of weather bulletins originating or transmitted on USAF circuits in Zone I (Caribbean and South America). This includes bulletins, facsimile charts, codes, stations transmitted at each time from each place, etc. All manner of surface, upper and airways data and forecasts are listed. Chart of Northern Hemisphere shows section of area included in each facsimile chart. *Subject Headings:* **1. Weather message manuals 2. Communication manuals 3. Meteorological transmission.** —*M.R.*

11.7–16 551.509.1(02)

U. S. Air Weather Service, **Weather message contents handbook.** 2nd ed. Its *AWS Manual*, 105-2, Part 8, 2d ed., Oct. 15, **1955.** 18+102+6 p. Also **Revision** No. 1, Jan. 10, **1956** (for corrections, insertions or deletions). **DWB** (M055.U58am). "This manual supersedes *AWS Manual* 105-2, Pt. 8, pub. Jan. 1, 1955." (*See* 7.3–122, March 1956, *Met. Abstracts.*)—Many changes were made in this manual between Jan. 1 and Oct. 15, 1955 and further changes are indicated in the supplementary revision sheets. *Subject Headings:* **1. Weather message manuals 2. Communication manuals 3. Meteorological transmission.** —*M.R.*

11.7–17 551.501.1(02)

Belgian Congo. Service Météorologique, **Cours de météorologie à l'usage des observateurs, 551.5(075.2) (675).** [Course in meteorology for observers.] Edition provisoire. (Leopoldville, Centre Météorologique), **1954.** 2 vol. (126 and 110 p.) figs., tables. Mimeo. **DLC** (QC871.C72 1954)—A practical manual or course in meteorology giving elementary principles of meteorology, instruments, methods of observation, etc. with examples and conversion tables (directions for making surface, solar radiation and upper air cloud observations). The second volume gives codes and specifications in great detail, with examples for the Belgian Congo. *Subject Headings:* **1. Observers manuals 2. Code specifications 3. Belgian Congo.**—*M.R.*

11.7–18 536.5:621.38(02)

†U. S. Bureau of Ships (Navy), **Manual of temperature measuring techniques, units, and terminology for electronic equipment.** Its *NAVSHIPS* 900,187, April 15, **1954.** 38 p. 15 figs. (incl. photos), 3 tables, 26 refs. **DWB** (621.34 U583ma)—Thermal measuring procedures to be used by engineers engaged in the design and development of miniaturized electronic equipment (requiring heat removal devices) are described, including various types of thermocouples and temperature indicating paints and waxes. *Subject Headings:* **1. Electronic equipment 2. Miniaturized electronic equipment 3. Temperature measurement techniques.** —*G.T.*

11.7–19 551.510.42(02)

*†Magill, Paul L.; Holden, Francis R. et al (*eds.*), **Air pollution handbook.** N. Y., McGraw-Hill, **1956.** Each section repaged (about 675 p.). figs., tables, bibliogs., eqs. throughout. All articles abstracted separately. **DWB** (M10.42 M194), **DLC** (TD883.M35). Review by R. S. Scorer in *International Journal of Air Pollution*, N. Y., 1(1/2):149–150, Oct. 1958. Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 8(3/4):446–448, **1958.**—A comprehensive and expert handbook bringing together information

on the major aspects of the problems of air pollution. It is designed to be used section by section. Each section is independent and treats a single aspect of the broad problem. In general, Sec. 1 and 2 state the situation, Sec. 3 through 6 discuss the science of air pollution, Sec. 7 through 9 consider effects, and thereafter describe various corrective techniques. The list of 31 contributors appears at the beginning of the book. *Subject Headings:* **1. Atmospheric pollution handbooks. I. Ackley, Charles** (*ed.*) **II. Sawyer, Frederick G.** (*ed.*).—*I.S.*

3. POPULAR SCIENCE

11.7–20 621.396.8:523.164

Pfeiffer, John, **The changing universe: the story of the new astronomy.** New York, Random House, **1956.** 243 p. numerous illus. **DLC** (QB44.P43). Review by F. G. Smith in *Nature*, London, 181(4614):980, April 5, **1958.** Review by A. J. M. Wanders in *Hemel en Dampkring*, The Hague, 56(11):217–218, Nov. **1958.**—The exciting story of radio astronomy from the accidental discovery which led to its birth in New Jersey in 1931–33 (by KARL JANSKY) and development during 1938–44 (by GROTE REBER) in Illinois, and its post war development in England and Australia up to the building of the huge radio telescopes and even larger ones proposed in the last few years. Radio waves from Orion, the Galaxy, the solar system, the sun, constellations from beyond the Milky Way, Belts of Galaxies, source of energy, hydrogen sources, obscuring dust, birth of stars, spiral arms, meteor echoes, the moon, atmospheric absorption and transmission, twinkling radio stars, relation of radio stars to atomic power, are described in a lively manner by a thoroughgoing science reporter in this book. *Subject Headings:* **1. Radio astronomy 2. Popular science books. I. Jansky, Karl II. Reber, Grote.** —*M.R.*

11.7–21 551.5:797.14

Proctor, Ian, **Sailing: wind and current.** London, Adlard Coles, **1953.** 199 p. 98 figs., tables. **DLC** (VK543.P7)—A practical and informative book on navigation of small boats: current and wind prediction, tides, currents, waves, winds, thermal winds, coastal winds, weather reports, clouds, squalls, local signs or indications of weather, etc. for those engaged in sailing small craft or racing. Considerable attention is paid to the basic principles involved in the above elements, with graphic rather than mathematical illustrations, and current, weather and synoptic examples from the region of the British Isles. *Subject Headings:* **1. Sailing weather 2. Small craft navigation 3. British Isles.**—*M.R.*

11.7–22 551.5:840

Dufour, L., **Les écrivains et la météorologie.** [Writers and meteorology.] *Ciel et Terre*, Brussels, 75(5/6):214–219, May/June **1959. DLC**—Author attempts to appraise the meteorological knowledge of two French writers through the study of their principal novels. J. MICHELET (1798–1874) saw meteorology as a poet and his descriptions of meteorological phenomena are not always exact. P. LOTI (1850–1923) was a naval officer, and his novel **Pêcheur d'Islande** includes in all likelihood the finest description of a storm in French literature. The author gives some excerpts from this description which prove that LOTI was a keen observer and had studied meteorology. One distinguishes clearly through the changes in wind, cloudiness, visibility and aspect of the clouds, all the phases of the passage of a storm depression. The aspect of the sea is given in such an excellent manner that it is possible to determine to which figure of the code "sea-condition" it corresponds. *Subject Headings:* **1. Meteorology in literature. I. Michelet, J. II. Loti, P.**—*A.V.*

11.7–23 551.5(023) 551.582(777)

Shaw, Robert H. and Elford, C. R., **Weather.** Reprints of 8 articles from the *Iowa Farm Science*, Ames, Iowa, Vol. 2 and 13, Feb.–Oct., **1958.** Ames, Iowa, Iowa State Univ. of Science and Technology, Cooperative Extension Service, Aug. **1959.** 29 p. figs., photos. **DWB** (M S535we)—The 8 popular and cleverly illustrated articles in this series cover the following subjects: 1) what is weather?; 2) the atmosphere; 3) recording weather; 4) clouds; 5) weather changes; 6) Iowa weather types (synoptic examples); 7) forecast service; 8) climate of Iowa. *Subject Headings:* **1. Popular meteorology 2. Climate of Iowa 3. Weather types 4. Iowa.** —*M.R.*

11.7–24 551.5:087.5

Neurath, Marie, **Between earth and sky.** N. Y., Sterling Pub. Co., **1958.** 36 p. figs. **DWB** (M N494be)—A vividly illustrated juvenile book on the more sensational manifestations of nature in the realm of geophysics, hurricanes, tornadoes, waterspouts, water and ice clouds, lightning, thunder, rainbows, hail, snow, red sunsets, mirages, the ozone layer, meteors, auroras, methods of exploring the outer atmosphere, etc. The illustrations are all hand painted and in color. *Subject Heading:* **1. Juvenile meteorology books.**—*M.R.*

4. IGY—ARCTIC—ANTARCTIC

See also: **Arctic Ocean research** (Brown), 11.7–200; **Antarctic sea ice** (Herdman), 11.7–201.

11.7–25 551.506.22:551.510.535(54)

*Mitra, A. P. (*Indian Natl. Comm. for IGY, Natl. Physical Lab., New Delhi*), **The Indian programme for the International Geophysical Year, Pt. 1, Some results of the programme on ionosphere.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 17(10):395–401, Oct. **1958.** 7 figs., 2 tables, 4 refs. **DWB, DLC**—Conclusions obtained from analyses of IGY vertical incidence ionospheric data (1 million readings have been scaled in 1 year) from 11 stations in India (01°S to 19°N geomag. lat.). Station equipment, methods of analysis of records and data, relation to sunspot activity and prediction thereof, anomalies peculiar to equatorial latitudes (the bite-out at noontime, etc.); equatorial spread-F echoes, asymmetry of F layer with respect to geography, equator, and radio patrol of solar flares. Data are presented in tables and on graphs. *Subject Headings:* **1. Ionospheric networks 2. IGY ionosphere program 3. Indian participation in IGY 4. Solar flare patrol 5. India.**—*M.R.*

11.7–26 550.3:061.3 551.506.22:06.045

Popov, L. I., **Mezhdunarodnaia Assambleia geofizikov.** [International Assembly of Geophysicists.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:74–77, April **1959. DWB, DLC**—A report of the proceedings of the Fifth Assembly of the Special Committee for the IGY held in Moscow during July 29–Aug. 9, 1958. The resolutions and recommendations of the working group on meteorology, auroras and illumination of the night sky, oceanography, rockets and artificial earth satellites and on the world day are listed and some of the papers presented before the various sections are summarized briefly. *Subject Headings:* **1. International Geophysical Year, 1957–1958 2. IGY program.**—*I.L.D.*

11.7–27 551.5:550.3:061.3 551.506.22

Some International Geophysical Year achievements. *Nature*, London, 184(4686):604–605, Aug. 22, **1959. DWB**—Small pamphlet issued by the Royal Society as an interim statement at the end of the observational phase of the IGY. The pamphlet contains short notes, arranged under the fifteen subject fields, of statistical details of the work done and of important new deductions so far made from the IGY observations. The present paper briefly describes the pamphlet and lists some features of special interest in the fields of meteorology, geomagnetism, ionosphere, solar activity, cosmic radiation, oceanography and nuclear radiation. *Subject Headings:* **1. International Geophysical Year, 1957–1958 2. IGY research.**—*I.S.*

11.7–28 550.3:061(47) 551.506.22

Routledge, N. A., **Russian contributions to the International Geophysical Year.** *Nature*, London, 183(4668):1087–1088, April 18, **1959. DWB**—Not less than 86 scientific institutions in the U.S.S.R. are engaged in research in Antarctica, the Arctic, and in such subjects as rocketry, space, zodiacal light, meteorites, earth currents, seismology, oceanic structure, etc. Brief outline of the Russian participation and contribution is given under the respective subject headings. *Subject Headings:* **1. Soviet participation in IGY 2. Soviet Antarctic research 3. Soviet Arctic research.**—*W.N.*

11.7–29 551.557:551.524.7:551.513.2(98)

Wexler, H. and Moreland, W. B. (*both, U. S. W. B., Wash., D. C.*), **Winds and temperatures in the Arctic stratosphere.** (In: Polar Atmosphere Symposium, Oslo, July 2–8, 1956,

Proceedings, Pt. 1, Meteorology Section. N. Y., Pergamon Press, **1958.** p. 71–84. 9 figs., 3 maps (fold.), table, 23 refs.) Also issued in: *Journal of Atmospheric and Terrestrial Physics,* London, Special Supplement, Pt. 1, **1957.** p. 71–84. **DWB, DLC** —Earlier investigations are reviewed and discussed in light of abundant data available recently on the atmospheric conditions in the Arctic, especially winds and temperatures at 50 mb. The cold cyclones and warm anticyclones prevailing at this level do not exhibit any appreciable connection with the lower level pressure systems. The difference of opinion as to whether the Arctic stratosphere is cold or warm may be due to the shifting locations from one year to another of slowly moving 50 mb cyclones and anticyclones. The temperature difference between these large cells (20°C to 30°C) appear to be controlled by vertical motions. In winter, the Arctic and the Antarctic stratosphere have many similar features, however, the former had 5–10°C warmer monthly means. Some evidence for the existence of the Polar-Night Jet is discussed involving variation of the ozone content at Tromsö, Norway. *Subject Headings:* **1. Arctic stratospheric charts 2. Stratospheric temperatures 3. Arctic.**—*W.N.*

11.7–30 91.04(98) 551.5:550.3(98)

†Armstrong, Terence, **The Russians in the Arctic: aspects of Soviet exploration and exploitation of the Far North, 1937–1957.** Fair Lawn, New Jersey, Essential Books, **1958.** 182 p. photos, 23 refs., maps. **DWB** (919.8 A738ru). Review in *Scottish Geographical Magazine,* 75(2):121–122, Sept. **1959.**—This popular presentation of the subject is entertaining and presented in nontechnical language in chapters dealing with: (1) drift of the "Sedov", (2) pole of relative inaccessibility, (3) high latitude air expeditions and drifting stations, (4) voyage of the German raider "Komet," (5) Northern sea route, (6) Soviet rule and the people of the Arctic, (7) Arctic archaeology, (8) Siberian mammoth. Excellent photos, good maps and a well organized index are provided. Reference is made to further sources for each chapter, most of which are in Russian, but if an English translation is available this is indicated. In conclusion, there is a factual summary including items of meteorological interest. *Subject Headings:* **1. Arctic exploration 2. Soviet Arctic expeditions 3. Arctic.**—*W.N.*

11.7–31 551.501.9(987):551.311.184

[Izvestiia, Moscow?], **[Selections from the Izvestiia, 1954, on Soviet drifting stations in the Arctic.]** Translations into English by Michael Dane. Issued by American Meteorological Society under Contract AF 19(604)-1364, June 27, **1955.** 20 p. typescript. Contents: Shcherbakov, D. I., **Po tsentral'noĭ Arktike: putevye vpechatleniia** [Across the central Arctic: travel impressions]. *Izvestiia,* July 27, **1954.** p. 2. Klenova, M.: **V glubinakh okeana: zapiski geologa moria** [In the ocean depths: notes of a marine geologist]. *Izvestiia,* Sept. 5, **1954.** p. 2. Dralkin, A. G., **Cherez piat' paralleleĭ** [Across five parallels]. *Izvestiia,* Nov. 12, **1954,** p. 1.—The first of the three papers translated deals with an authentic account of a 16,500 km flight across the Soviet section of the Arctic, visiting the U.S.S.R. scientific stations and camps established under the 1954 High Latitude Expedition. The second paper briefly describes a collection of sea bottom samples aboard the ice floe station "North Pole 4," Aug. 11–14, 1954. Sediments from 1490, 1590 and 1740 m depths confirm the law of sedimentation. Cursory investigation indicates change of sedimentation conditions over a long period of time. The third paper is a summary of a number of various scientific observations taken during the 1600 km drift, crossing five parallels in 7 months. Only general comments are made on weather, etc. in each these papers. *Subject Headings:* **1. Soviet ice floe stations 2. Arctic drift expeditions 3. "Severnyi Polius" 4. Expedition, 1954 4. Arctic.** —*W.N.*

11.7–32 91.04(98) 551.506.5(98)

Joensen, Poul Holm., **Forskere i Ishavet.** [Polar investigations.] Copenhagen, Gyldendal, **1956.** 28 p. photos, map, 11 refs. (*Faglig Laesning,* No. 290.) **DLC** (G620.J6)—An illustrated pamphlet describing briefly the recent activities in the Arctic by scientists, scientific expeditions and by air, to search out the nature of this vast region. The Northeast and Northwest Passage, early drifting stations of "Fram" and "Maud," "Papanin," Ice Islands (T-3), Soviet drifting stations Nordpol 1, 2, 3, 4, 5, and 6, and other expeditions are taken up in separate short chapters. Commercial airplane flights across the Arctic, North Greenland, etc. are mentioned. *Subject Headings:* **1. Arctic expeditions 2. Arctic.**—*M.R.*

11.7–33 551.513(98)(087.4)

*†McGill Univ. Arctic Meteorology Research Group, **Contributions to the study of the Arctic circulation: a report on the Second Seminar in Arctic Meteorology, Stanstead College, July 29–Aug. 9, 1957.** Ed. by C. V. Wilson. Contract AF 19(604)-1141, Publication in Meteorology, No. 9; Scientific Report, No. 7, March **1958.** 78 p. figs., tables, refs., eqs. Contents: Godson, W. L.: **Canadian meteorological program for the International Geophysical Year,** p. 1–8. Godson, W. L.: **Models for numerical weather prediction,** p. 9–19. Godson, W. L.: **High-level fields of wind and temperature over the Canadian Arctic,** p. 20–21. Keegan, Thomas J.: **The winter-time circulation in the Arctic troposphere,** p. 22–47. Reed, Richard J.: **Arctic synoptic analysis,** p. 48–59. Reed, Richard J.: **Cold Polar vortices,** p. 60–68. Reed, Richard J.: **Baroclinic graphical prediction model,** p. 69–76. **DWB** (919 M145s). All articles abstracted separately. *Subject Headings:* **1. Arctic air circulation 2. Arctic meteorology seminars 3. Arctic. I. Wilson, C. V.** (*ed.*).

11.7–34 550.3:061.3(99)

Sen'ko, P. K., **Geofizicheskie issledovaniia v Antarktide.** [Geophysical explorations in Antarctica.] *Priroda*, Moscow, 7:59–62, July **1958.** 2 figs. **DLC**—Some of the results of seismological, terrestrial magnetic and ionospheric observations carried out in 1956 at Mirny, Antarctica, are summarized. The seismographs were capable of recording elastic oscillation of the ground with periods of 1–10 sec. In the first seven months some 200 earthquakes were recorded but only in about ⅛ could the coordinates of the epicenters be established and for only half of these could the epicenter distances be computed. The centers of the earthquakes were in the southwest Pacific. The relationship between microseisms and synoptic situations was investigated. In the winter-spring period, when the surface of the sea is covered with ice for hundreds of kilometers, microseisms with oscillation periods of 6–10 sec. were observed; in summer-fall, when ice fields are close to the shore, the microseisms have a smaller period but with an amplitude up to 7μ. Short wave communication between Mirny and Moscow was best at night when radio waves were propagated along the shortest distance (15,000 km); in the afternoon a more intense signal passed through the regions of the South and North Poles (25,000 km). Owing to the absorption effect of the thick ice layer, radar communications in the heart of Antarctica could be carried on with medium length waves for short distances. The absolute and variable values of the elements of the earth's magnetic field were measured along the line Mirny-Pioneerskaia. At Mirny the magnetic field disturbance showed a maximum at noon or in the afternoon hours of mean local time. During the winter (May–Aug.) there was a second nocturnal maximum disturbance near local midnight in addition to daily maximum disturbance. In summer (Nov.–Jan.) there was a general increase in magnetic disturbances associated with an increased intensity of diurnal disturbances. At Mirny the aurora was observed primarily in the northern part of the sky. The magnetic variations as shown by the curve of the vertical component displayed considerable local differences within short distances (10 and 13 km). The cause of the local variations is attributed to an electrical current of abnormally large density flowing along the sea coast. The instrumentation and aims of studies on cosmic rays and auroras by the second continental expedition in 1957 are outlined. *Subject Headings:* **1. Geophysical data 2. Soviet Antarctic research 3. Antarctica.** —*I.L.D.*

11.7–35 91.04(99) 551.506.22(47)

Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGG, **The thematic plan and programme of the Complex Antarctic Expedition of the USSR Academy of Sciences, 1955–1958.** Moscow, USSR Academy of Sciences, **1956.** 20 p. At head of cover-title: U.S.S.R. National Committee for the International Geophysical Year, 1957–1958, Antarctic Council. **DWB** (919.9 I613th)—The basic scientific investigations of the Complex Antarctic Expedition of the U.S.S.R. Academy of Sciences during 1955–1958 included the following fields: The influence of the Antarctic weather processes on the general circulation of the earth's atmosphere; the geophysical phenomena in the Antarctic; the physiographic mapping and description of the Antarctic regions; the Antarctic ice cover; the geological characteristics of the Antarctic region; an aerial survey; the main features of the mass transport currents of Antarctic waters in relation to the general circulation of world oceans; the geological

structure of the ocean bottom in the Antarctic region; the sea ice conditions in Antarctic waters; wind waves in the South Polar basin and zonal distribution of marine fauna in the world ocean. *Subject Headings:* **1. Soviet participation in IGY 2. IGY Antarctic expeditions 3. Soviet Antarctic expeditions 4. Antarctica. I. IGY, 1957/1958. U.S.S.R. National Committee.**—*N.N.*

11.7–36 91(99) 551.5:550.3(99)

†Avsiuk, G. A.; Markov, K. K. and Shumskiĭ, P. A., **Geographical observations in an Antarctic "oasis."** Moscow, USSR Academy of Sciences, **1956.** 69 p. fig. At head of cover-title: U.S.S.R. National Committee for the International Geophysical Year, 1957–1958, Antarctic Council. **DWB** (919.9 I613ge). Transl. of original Russian: **Geograficheskie nabliudeniia v antarkticheskom "Oazise,"** in *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 88(4):316–350, July/Aug. **1956.** 12 figs., 2 tables, 35 refs.—The report summarizes the geophysical and geographical factors that are responsible for the presence of an oasis on the Antarctic continent. It outlines the location and dimensions of the Bunger Oasis, the main features of the relief and the geological structure, some specific climatic conditions, the present exogenetic processes and all the weather conditions of the area. *Subject Headings:* **1. Soviet participation in IGY 2. Soviet Antarctic research 3. Bunger Oasis, Antarctica. I. Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGG.**—*N.N.*

5. CONFERENCES—SYMPOSIA

See also: **Meeting of Special Committee for IGY** (Popov), 11.7–26; **Arctic met. seminar, 11.7–33; Ionos. conf., 11.7–139.**

11.7–37 621.396.1:551.510.62:551.510.535:061.3

Keary, T. J. (*Navy Electronics Lab., San Diego*), **International Conference on Radio Wave Propagation.** *Institute of Radio Engineers, N. Y., Proceedings*, 47(6):1147–1148, June **1959. DWB**—Brief reviews of 15 or so of the 55 papers read by the 100 radio scientists from 12 countries who attended the Congrès International sur la Propagation des Ondes Radio Electriques, Oct. 6–11, 1958, at the Palais des Congrès at Liége, Belgium. Papers dealt with summaries of progress on work over the past few years in the following areas (under which the abstracts are arranged): (1) Beyond-the-horizon propagation of UHF waves; (2) Ionospheric back-scattering research; (3) Forward scattering from ionized meteor trails; (4) Low frequency propagation. The complete text will be published by Academic Press. *Subject Headings:* **1. Radio wave propagation conferences 2. Ionospheric radio wave propagation 3. Liége, Belgium.**—*M.R.*

11.7–38 551.584:061.3

Laĭkhtman, D. L., **Konferentsiia Glavnoĭ geofizicheskoĭ observatorii po meteorologii prizemnogo sloia vozdukha.** [Conference of the Main Geophysical Observatory on the meteorology of the air layer near the ground.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 10:1273–1274, Oct. **1957. DLC**—A report of the conference on the meteorology of the atmospheric layer near the ground that was held at the Main Geophysical Observatory from May 7 to 10, 1957. Brief summaries are given of the papers delivered. These dealt with meteorological processes at the ground layer in Antarctica (N. P. Rusin), the meteorological characteristics of the atmospheric layer near the ground in various geographic zones of the U.S.S.R. (P. A. Vorontsov), microclimatic studies and heat balance in the sandy desert and Pamir (B. A. Aĭzenshtat and M. V. Zuev), etc. *Subject Headings:* **1. Micrometeorological conferences 2. U.S.S.R.**—*I.L.D.*

11.7–39 551.590.2:061.3

†American Geophysical Union. Committee on Cosmic-Terrestrial Relationships, **Report of the Committee, 1957–1959.** E. H. Vestine, Chairman. *Journal of Geophysical Research*, Wash., D. C., 64(8):1077–1091, Aug. **1959.** 83 refs. **DWB, DLC**—The Committee has functioned during the report year by (1) holding a Symposium on Cosmic-Terrestrial Relationships at the Thirty-Ninth Annual Meeting of the American Geophysical Union (Appendix 1),

(2) noting and encouraging the production of books in the general area of cosmic-terrestrial relationships (Appendix 2), and (3) preparing a short summary of progress made during the past report year in the general area of cosmic-terrestrial relationships. Under (1) will be noted a number of papers of quite special interest, including some dealing in part with IGY activities. It is believed that another symposium of this general type, perhaps covering some additional topics, should be held soon because of new opportunities for researches based on IGY data. (2) The Committee notes with pleasure the appearance of several new books and the several books planned or in preparation which are mentioned in Appendix 2. (3) The Committee has noted most encouraging accomplishments in its general area of interest during the past report year. One of the most gratifying aspects has been the high degree of public awareness and interest in the various basic researches that are under way in cosmic-terrestrial relationships. The press and other media, such as television, brought many matters in our area of interest before the scientific and general public, with results of educational and other useful benefits. The great international scientific venture of the IGY was of material help because it brought a great number of new workers to the general area of cosmic-terrestrial relationships. It is to be hoped that a number of these new workers will continue work in geophysics. To this end a number of the Committee members, and other interested supporters are active in various related organizations, such as the National Academy of Sciences, the American Geophysical Union, the National Science Foundation, and the IGY. They are working for a continued geophysical effort following the IGY. The Committee has necessarily achieved only partial coverage of the general field of cosmic-terrestrial relationships in this report. It has, however, sought to cover at least a major portion of those activities of interest to members of the American Geophysical Union. *Subject Headings:* **1. Cosmic effects 2. American Geophysical Union. Committee on Cosmic-Terrestrial Relationships.**—*Author's introduction.*

11.7–40 551.5:06.043(47)

Ogneva, T. A., **Na itogovoĭ sessii Uchenogo soveta Glavnoĭ Geofizicheskoĭ Observatorii im. A. I. Voeĭkova.** [At the Summary Session of the Scientific Council of the A. I. Voeĭkov Main Geophysical Observatory.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:60–61, May **1959. DWB, DLC**—The Scientific Council held its summary session for reviewing the research for 1958 during Dec. 23–27, 1958. M. I. Iudin held forth on computational methods of forecasting pressure, temperature and wind fields by means of semiempirical methods and electronic computers. O. A. Drozdov showed that on the basis of established close relationships between the amount of precipitation and moisture content over European U.S.S.R. it is possible to compute the precipitation over large areas. T. V. Pokrovskaia discussed the atmospheric temperature anomalies over European U.S.S.R. and western Siberia. N. S. Shishkin discussed the form change of convective clouds during precipitation and, on the basis of the layer method, he proposed a method of computing the amount of convective clouds, vertical velocities during cloud disintegration, time of disintegration of convective clouds during unstable stratification, etc. K. S. Shifrin held forth on the radiational properties of clouds during fogs and on an optical method of studying the microstructure of clouds during fogs. L. B. Krasil'shchikov described an airplane apparatus for investigating the spectral characteristics of the underlying surface in the atmosphere and devices for ground measurements of coefficients of brightness under field and laboratory conditions. L. E. Anapol'skaia reported on the wind velocity regime over the U.S.S.R. A. V. Rudneva presented a regional classification of the U.S.S.R. on the basis of rime and icing of wires incidence. *Subject Headings:* **1. Meteorological research 2. Meteorological conferences 3. U.S.S.R.**—*I.L.D.*

11.7–41 551.510.536:061.3

Ratcliffe, J. A. et al., **Transition from the ionosphere to interplanetary space.** Geophysical discussion of the Royal Astronomical Society, Feb. 21, 1958. *Geophysical Journal*, London, 1(3):263–266, Sept. **1958. DWB, DLC**—Under chairmanship of J. A. Ratcliffe, a discussion was held at the Royal Astronomical Society headquarters. Sydney Chapman spoke on his static theory of heating of the outer atmosphere by the solar corona. D. E. Blackwell discussed optical observations of the zodiacal light. J. V. Evans, of Jodrell Bank Observatory, spoke on radio echoes from the moon. K. Weekes, of Cavendish Laboratory, Cambridge University, reported on ionospheric deduction based on satellite observations and J. A. Rat-

CLIFFE summarized work on whistlers and audio frequency atmospherics at Stanford and Boulder, Colo. A. HEWISH discussed observations of radio stars (made at Cambridge) observed through the solar corona. *Subject Heading:* **1. Outer atmosphere symposia.**—*M.R.*

11.7–42 551.586:581.03:631.544.4

Nottingham, England. Univ. Easter School of Agricultural Science, **Control of the plant environment: proceedings of the Univ. of Nottingham fourth Easter School in Agricultural Science, 1957.** N. Y., Academic Press, **1957.** 240 p. figs., tables, refs. Price: 42 sh. **DLC** (QK711.N6 1957). Review by E. W. Yemm in *Endeavour*, 18(69):53, Jan. **1959.**—This book contains 53 separate articles (in 22 chapters) on various aspects of: I) Effect of environment on plants; II) Control of environmental factors for plant experimental work; III) Installations for control of plant environment; and IV) Measurement and demonstration of control. Ch. 6, by F. H. WHITEHEAD, discusses **Wind as a factor in plant growth;** Ch. 8, by J. P. HUDSON, **The study of plant responses to soil moisture;** Ch. 16, **Wind tunnels;** Ch. 17, by E. J. WINTER, **Glasshouse temperature;** Ch. 18, **Measurement of radiation, air temperature, water loss, soil temperature,** etc.; and Ch. 22, **Influence of weather factors on growth of cucumber plants and lettuce,** etc. H. L. PENMAN contributes to the discussions of many of these subjects. Many of the articles deal with design of phytotrons, controlled chambers or growth rooms, with growth under controlled environments and with effects of illumination or radiation (natural and artificial) and temperature on specific plants. *Subject Headings:* **1. Climate controlled greenhouses 2. Phytotrons 3. Wind effects on plants 4. Plant climatology experiments. I. Hudson, J. P.** (*ed.*) **II. Penman, H. L.** *M.R.*

11.7–43 91(08)

†Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, **Voprosy geografii: sbornik statei dlia XVIII go Mezhdunarodnogo Geograficheskogo Kongressa.** [Questions in geography: collected papers for the 18th International Geographical Congress.] Moscow, Akademiia Nauk SSSR, **1956.** 392 p. figs., tables, bibliogs. **DLC** (G58.G35), **DWB**—This is a collection of papers prepared by the Geographic Society of the U.S.S.R. in connection with the 18th International Geographical Congress. It contains articles dealing with the problems of: Methodology and the teaching of geography, Cartography and photogrammetry, Paleography and geomorphology, Climatology, Hydrology, Biogeography, Geography of population, Medical, Agricultural, Industrial, Historical and Regional geography. At the same time, the Board of Editors of the collection took advantage to present reports summing up theoretical and methodological results of particularly important investigations in the domain of geography carried out in the U.S.S.R. *Subject Headings:* **1. Geography 2. Collected geographical papers 3. Geographical congresses.**—*A.M.P.*

6. SERVICES—INSTITUTIONS

See also: **Aeromet. services** (Schweitzer), 11.7–82; **Aeromet. services,** 11.7–83; **Met. services,** 11.7–111.

11.7–44 551.5:061.1(44)

Coroli, Roger, **Regards sur la Météorologie Nationale.** [Remarks concerning the French Meteorological Service.] *France. Secrétariat Général à l'Aviation Civile et Commerciale, Bulletin de Liaison et de Documentation*, No. 95:7–20, March 15, **1958.** 10 figs. **DLC**—After a short historical account of the French National Meteorological Office, the author gives a survey of the importance of its activities. The research centers at Trappes and Magny-les-Hameaux, the school of meteorology and the stationary ocean weather ships are described. *Subject Headings:* **1. French meteorological service 2. Meteorological research institutes 3. France.**—*A.V.*

11.7–45 551.5(064)

Sinel'shchikov, V. V., **Gidrometeorologicheskaia sluzhba na Vsesoiuznoĭ Sel'skokhoziaĭstvennoĭ Vystavke.** [The Hydrometeorological Service at the All-Union Agricultural Exposition.] 2d ed. Ed. by F. F. Davitaia. Leningrad, Gidrometeoizdat, **1957.** 87 p. figs. and

photos. (For abstract on 1955 ed., *see* 8.9–102, Sept. 1957, *Met. Abstracts.*) **DLC** (QC857.R9S5 1957)—This is the second and somewhat enlarged edition of the pamphlet giving details of the Hydrometeorological Pavilion at the permanent All-Union Agricultural Exposition. The innovations introduced into the exhibits of the Hydrometeorological Service since 1955, consisting mainly of new Soviet instruments and new maps and displays, are described and illustrated. A special gallery with tables and dioramas featuring work carried on in the IGY program, and explorations in the Arctic and Antarctic has been added. *Subject Headings:* **1. Meteorological exhibitions 2. Soviet Hydrometeorological service 3. Soviet participation in IGY. I. Davitaia, F. F.** (*ed.*).—*A.M.P.*

11.7–46 551.58:061.2

Wiggett, P. J. (*Met. Office, Harrow*), **World climatology: a public service.** *Weather*, London, 14(3):101–102, March **1959.** ref. **DWB, DLC**—Scope and activities of the Enquiries Section of the World Climatology Branch located at Harrow, Middlesex, are outlined here. The nucleus of the information is a wide collection of tables of meteorological data for some 2,000 places over the globe. Tables are classified under a card index system, with notes on useful additional information. Popularity prompted a revised edition of the tables to be published by the Meteorological Office in 1958. *Subject Headings:* **1. World climate coverage 2. Public information services 3. Meteorological data.**—*W.N.*

11.7–47 551.501.9:550.3:061.2(09)(47)

Bukhnikashvili, A. V., **Dvadtsatipiatiletie Instituta geofiziki Akademii nauk Gruzinskoĭ SSR.** [Twentieth anniversary of the Geophysical Institute of the Academy of Sciences of the Georgian S.S.R.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 10:1153–1161, Oct. **1958. DLC**—The history of geophysical investigations in Georgia (U.S.S.R.) is reviewed briefly. In the beginning of the 18th century BAKHUSHTI BAGZATIONI published a description of the climate of various parts of Georgia and in 1844 the Tiflis Observatory was founded. Extensive geophysical investigations began in the Georgian S.S.R. after the first World War. The Tiflis Observatory was replaced by the Geophysical (meteorological) Observatory of the Tiflis Hydrometeorological Research Institute; the Dushet' Magnetic Observatory of the Institute of Geophysics of the Academy of Sciences of the Georgian S.S.R. and the Tiflis Teleseismic Station. The history of the organization of the Institute of Geophysics of the Academy of Sciences of the Georgian S.S.R. since 1933 and the research that has been carried out up to the present are outlined. At present the research program is concentrated on the following subjects: electromagnetic field of the earth and variation of the intensity of cosmic radiation, seismic conditions of the Caucasus and its seismic regions; structure and movement of the earth's crust in the Caucasus and development of methods and instruments of geophysical exploration; and cloud physics and cloud modification. The Dushet' Geophysical Observatory investigates telluric currents in geological exploration. In the field of atmospheric physics, the Institute of Geophysics has carried out the following investigations: study of the density, conductivity, temperature gradient, radiational, mechanical and other properties of snow cover (begun in 1946–1947); hail phenomena in Kakhetia and methods of hail prevention (begun in 1952), etc. The seismological, geological and other studies carried out in the Georgian S.S.R. and the role of the Géophysics Institute in the IGY programs are outlined. Names of the leading geophysicists and the research programs with which they are associated are cited. *Subject Headings:* **1. Geophysical observatories 2. History of geophysical organizations 3. Georgian S.S.R.**—*I.L.D.*

11.7–48 551.5:061.6(73)

Petterssen, Sverre, **1958, a year of progress.** *Weatherwise*, Boston, 12(1):3–5; 36–37, Feb. **1959.** 2 figs. **DWB**—Besides one noted acquisition—a historically famous mansion at 45 Beacon St., Boston, given to the American Meteorological Society by the trustees of the Bulfinch House Trust—the year 1958, on the whole, was one of planning. Early in 1958 the Committee on Meteorology of the National Academy of Sciences submitted its first report with three major recommendations. First, that the present support for basic research in meteorology at universities be increased immediately by fifty to one hundred percent. Second, that the National Institute of Atmospheric Research be established through collaboration

between leading universities. The third asks the American Meteorological Society to seek the funds necessary to develop and activate a comprehensive program to stimulate interest in meteorology ten-fold or more. The responses to the recommendations have been most gratifying. The National Science Foundation has established a separate Atmospheric Science Program. Also early in 1958 fourteen universities formed the University Committee on Atmospheric Research (UCAR) to consider plans for establishing a National Institute of Atmospheric Research. The American Meteorological Society has also devised several plans. It has already started a program of travelling lecturers to arouse interest in meteorology on college campuses. A widening of meteorological interest and activities appears to be the general outlook in the field. *Subject Headings:* **1. Progress in meteorology 2. American Meteorological Society activities.**—*I.S.*

7. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

Education

11.7–49 53:551.5

Neuberger, Hans H. and Teweles, Sidney, Jr., **Fizik.** [Physics.] Ankara, **1957.** 50 p. Mimeo. figs., tables. (Notes from a course in the Meteorological Training Course at the Istanbul Technical University, 1954–1955, Istanbul.) Transl. into Turkish by Cemal Bergen. On cover: T. C. Başvekalet Devlet Meteoroloji Iş. Um. Md. **DWB** (M(07) N478mef)—A basic course in physics which would be prerequisite to a study of college meteorology for practical work (not research). Chapters cover dynamics, mechanics, geometric and physical optics, radiation, static electricity, meteorological acoustics and meteorological optics, atmospheric electricity, magnetism, atmospheric and solar radiation, etc. *Subject Headings:* **1. Physics for meteorologists 2. Turkish language. I. Bergen, C.** (*transl.*)—*M.R.*

11.7–50 551.5(08)

Schaefer, Vincent J. (*Dir. of Res., Munitalp Found.*), **Can we do it better?** *American Meteorological Society, Bulletin*, 39(2):90–92, Feb. **1958.** "Synopsis of a talk presented during the panel discussion entitled "Problems confronting the professional meteorologist" held at the National Meeting of the A.M.S., Monterey, Calif., June 11–13, 1957." **DWB, DLC**—A general discussion of various problems which meteorology faces in its continued development as a science, especially with the adoption of ways to increase the quantity and quality of research. The author discusses the resistance to new ideas and innovations, the backlog of manuscripts existing in scientific journals, the tendency of some editors and reviewers to prevent the publication of new hypotheses, the promotion of original thinking and provision of a suitable environment for research, the promotion of interdisciplinary research, the improvement of scientific meetings, and the increase of emphasis on observational techniques in meteorological education. As an example of improved scientific conferences, the author describes the Adirondacks Conference on Atmospheric Nuclei held in October 1957. *Subject Heading:* **1. Meteorological research.**—*I.L.D.*

11.7–51 551.5(74):8

Willson, Lawrence, **Thoreau and New England's weather.** *Weatherwise*, Boston, 12(3): 91–94, 118–124, June **1959.** 4 figs. **DWB**—A number of characteristics of THOREAU indicate his varied interests and activities. A resident of New England, he liked to know about the place as thoroughly as possible. He sought to discover that nature and men were in perfect harmony, if they chose to be. Thus his interest in weather is one of the major aspects of his concern with nature. He carried his research back to what he could learn about the attitude of the aborigines toward weather. The eleven unpublished volumes of extracts from works relating to Indians indicate his extensive study. Of greater value was the information he gleaned concerning the planting and harvest of Indian corn. Like other weather experts, he also studied signs and his observations in this regard were considered sound. In fact, he came to be regarded as a sort of local oracle on the weather. Due to a number of factors which are stated in the paper he paid more attention to winter and spring. He also accomplished a great deal of research concerning the Canadian winter. THOREAU believed that prediction

of the weather is a transcendental occupation. With reference to his achievements in science, it is said that he would have been a significant natural scientist had he gone to study under BENJAMIN SILLIMAN at Yale instead of Harvard. *Subject Headings:* **1. Meteorology in literature 2. Thoreau, Henry David.**—*I.S.*

11.7–52 551.5(023)

Hornstein, R. A. (*Dominion Public Weather Office, Halifax, N. S.*), **Weather and why.** Canada. Dept of Transport, Meteorological Div., Toronto, **1954.** 61 p. 8 illus.—Questions most frequently asked by nonscientist listeners of meteorological radio and lecture programs are answered in a popular manner. The questions concern several popular weather maxims, singularities, terms used in weather forecasts, optical phenomena, etc. *Subject Heading:* **1. Popular meteorology.**—*G.T.*

11.7–53 551.5:37

World Meteorological Organization, **Report on meteorological training facilities. (1959)?** 69 p. Mimeo. **DWB** (M(07) W927re)—The report lists all the nations that offer either informal or formal courses of training in meteorology. Details on the types and places of such educational facilities as well as the nature of courses offered in each of the following countries and nations are given: Argentina, Australia, Austria, Belgium, British East African territories, Denmark, the Federal Republic of Germany, Finland, France, Greece, Hungary, Italy, Norway, Pakistan, Philippines, Singapore, British territories in Borneo, Spain, Sweden, Switzerland, U.S.S.R., United Arab Republic, U.K., U. S. and Yugoslavia. *Subject Headings:* **1. Meteorological education 2. Meteorological courses.**—*N.N.*

HISTORY

11.7–54 551.579(09) 551.577:551.579(442)

Dooge, J. C. I. (*Univ. College, Cork, Ireland*), **Un bilan hydrologique au XVIIe siècle.** [Quantitative hydrology in the 17th century.] *La Houille Blanche*, Grenoble, 14(6):799–803, Nov. **1959.** 3 figs., 9 refs. **DLC**—Over a hundred years before the start of the Christian era, the volumetric method was used by HERO of Alexandria to measure the flow of springs. The measurement of rainfall is almost certainly of equal antiquity. It was not until the end of the 17th century, however, that any quantitative comparison of rainfall and runoff was made. The earliest attempt at such a comparison was crude in form, the units were inadequately defined and the arithmetic was faulty; even the identity of this pioneer in hydrometry is open to dispute. Nevertheless this first study is worthy of attention. The present paper deals with the comparison of rainfall and runoff on the Upper Seine made in 1674, with MARIOTTE's improved calculation for a larger catchment, published in 1686 and with the vexing question of the identity of the author of the earlier work. *Subject Headings:* **1. Hydrology 2. History of hydrology 3. Hydrologic balance 4. Rainfall—runoff relationships 5. Seine River, France.**—*Author's abstract.*

11.7–55 355.489 358.4(09)

†U. S. Air Force. USAF Historical Div., **The Army Air Forces in World War II, Vol. 7, Services around the world.** Prepared under the editorship of Wesley Frank Craven and James Lea Cate, by the USAF Historical Div. of Research Studies Institute, Air University. Chicago, Univ. of Chicago Press, **1958.** 666 p. notes and refs. by chapter, p. 585–638. Map on lining papers. numerous photos. **DWB** (940.5 U581ar) -Among various phases of Air Force activity discussed with extreme thoroughness in this volume are those of the Army Air Force Weather Service, treated in Ch. 11, p. 311–338. Importance of accurate forecasts and reports in actual operations are cited, the development of the Army Air Force Weather Service from the Signal Corps Service before the war, training of students at MIT, Caltech, and Chicago University, liaison with other organizations and committees, personnel involved (DON Z. ZIMMERMAN, March 1942, organized service), operations in Europe, Africa, the Far East, Arctic and the Pacific and, finally, technical problems during and after the war. *Subject Headings:* **1. History of U. S. Air Force 2. U. S. Air Weather Service. I. Craven, W. F.** (*ed.*) **II. Cate, J. L.** (*ed.*).—*M.R.*

11.7–56 551.521.1(09)

Abbot, C. G. (*Smithsonian Inst., Wash., D. C.*), **Smithsonian contributions to solar radiation measurement.** (In: Conference on the Use of Solar Energy, Univ. of Arizona, 1955, **Transactions,** pub. **1958.** Vol. 1:41–42. ref.) **DWB**—An historical approach is made on the achievements of such great men as S. P. LANGLEY, F. E. FOWLE and H. H. CLAYTON, all of the Smithsonian Institution, who revived and contributed towards solar radiation research during the years 1881 through 1955. Details of the achievements are contained in Vol. 3 to 7 of the *Smithsonian Astrophysical Observatory, Annals. Subject Headings:* **1. Solar radiation measurements 2. History of solar radiation research 3. Smithsonian Institution, Washington, D. C.**—*N.N.*

11.7–57 551.594.51:550.388.8

Morlet, M., **Sur les aurores boréales.** [Aurora borealis.] *Annales de Chimie et de Physique*, Paris, Ser. 3, 27:65–79, **1849.** table, eqs. **DLC** (QD1.A7)—Further investigations on the aurora conducted between 1847 and 1849 attempting to show the relation between geomagnetic forces and the aurora as an explanation of the luminous arc and its orientation. The fact that it is luminous is attributed to electrical discharges in the rarefied upper atmosphere. However, the theory was complicated greatly by an elaborate optical theory which explained the geometrical patterns by assuming multiple reflection and refraction from hexagonal prisms of ice oriented in all directions throughout the atmosphere. These crystals polarize the light coming from the magnetically disturbed electrical discharges. Several auroras dating from those observed by Mairan (1726–31 to Nov. 18, 1838, in London) are used to test this theory. Thus, although the greater part of the author's work was purely hypothetical, one statement regarding the origin of the aurora: "It seems natural to attribute it to electrical flux in the atmosphere, which at high altitudes where the air is very rare, should become luminous as under a vacuum receiver. This hypothesis would achieve great probability if one could prove by direct experiments that magnetism exerts an influence on luminous electric rays," came very close to the truth and set other scientists to working along modern lines to prove the magnetic and electrical nature of auroral discharge. *Subject Headings:* **1. Auroral theories 2. Geomagnetic effect on auroras 3. Ice crystal theory of auroral arc.** —*M.R.*

BIOGRAPHY

11.7–58 551.5:92

Nyberg, A., (**Biographical note on**) **Dr. Anders Ångström, 70 years on Feb. 28, 1958.** *Tellus*, Stockholm, 10(1):164, Feb. **1958.** port. **DWB, DLC**—Former Chief of Swedish Meteorological Bureau and later Director of Swedish Meteorological and Hydrological Institute, active in WMO and IUGG, retired in 1955 and is continuing further development of Ångström pyrheliometer. Secretary of Swedish Geophysical Society (founded in 1920) for 15 years and President for 2 periods (1936–38 and 1948–50). *Subject Headings:* **1. Biography of Anders Ångström 2. Ångström, Anders.**—*M.R.*

11.7–59 551.5:550.3:92

[**Obituary note on**] **Henryk Arctowski.** *American Meteorological Society, Bulletin*, 39(7): 359, July **1958. DWB, DLC.** Also: Zych Stanisław, [**Obituary note**] **Henryk Arctowski.** *Gazeta Obserwatora PIHM*, Warsaw, 11(3):(i.e., No. 123):3–4, March **1958.** photo. **DLC**—H. ARCTOWSKI died in Washington, D. C., Feb. 20, 1958. He was born in Poland, educated in Belgium and France, member of Belgian Antarctic Expedition of 1897–1899 and later with the Belgian Weather Service. ARCTOWSKI came to the U. S. in 1909. He was chief of the Science Division of the New York Public Library until 1920 when he returned to Poland to occupy the chair of geophysics and meteorology at the University of Lwow. He returned to the U. S. in 1939, becoming associated with the Smithsonian Institution where he remained until his retirement. *Subject Headings:* **1. Obituary of Henryk Arctowski 2. Arctowski, Henryk.**—*M.L.R.*

11.7–60 91.04(988) 551.5:92

Baumbach, S.; Gödecke, K. and Olbers, W., **Johannes Georgi 70 Jahre.** [Johannes Georgi, 70 years old.] *Annalen der Meteorologie*, Hamburg, 8(9/10):257–258, **1959. DWB,**

DLC—A brief account of the academic and scientific career of JOHANNES GEORGI who began his meteorological work during the first World War when he organized the marine aviation weather service in Wilhelmshaven. In 1919 he joined the Deutsche Seewarte. He participated in numerous expeditions, such as the radiation biological and meteorological expedition of F. DANNMEYER to Northwest Island (1926–1927), Deutsche Seewarte expedition on the "Meteor" to Iceland and Greenland (1929), the preliminary German Greenland expeditions of A. WEGENER, G. SORGE and F. LOEWE (1929), A. WEGENER's Greenland Expedition (1931) and in the construction and direction of Eismitte station. Much of his work was concerned with upper wind measurements, climate of Greenland inland ice, especially with the movement of cyclones over this region, importance of the atmosphere near the ground to radiation absorption and emission, etc. His support of the work of A. WEGENER and his skill in instrumentation during his Greenland expeditions is stressed. *Subject Headings:* **1. Biography of Johannes Georgi 2. Georgi, Johannes.**—*I.L.D.*

11.7–61 551.501.7:92

Weickmann, Ludwig (*Bad Kissingen*), **Zum Gedenken an Hugo Hergesell, geb. 29. Mai 1859.** [In memory of Hugo Hergesell, born May 29, 1859.] *Meteorologische Rundschau*, Berlin, 12(3):65, May/June **1959. DWB, DLC**—HUGO HERGESELL may be called the "father of aerology." He was one of the first to recognize the importance of observations of the "free atmosphere" in the solution of meteorological problems. As early as 1890 he began aerological investigations from the tower of the Strasbourg Cathedral and in numerous free balloon flights during the 90's. In 1896, at the International Conference of Meteorologists in Paris, he was instrumental in organizing an Aeronautical Commission of which he was elected president. In 1935 he was elected honorary president. Through this commission, HERGESELL exerted great influence on the organization of an international aerological network. The earlier meteorograph procedure developed by HERGESELL with the aid of KLEINSCHMIDT and DE QUERVAIN was replaced by the radiosonde—a term developed by HERGESELL. HERGESELL also recognized the importance of the airplane as a research tool in meteorology; he had made meteorological observations during a flight in 1909 with the WRIGHT brothers. *Subject Headings:* **1. Biography of Hugo Hergesell 2. Hergesell, Hugo.**—*I.L.D.*

11.7–62 551.5:92

†[**Obituary of**] **Dr. Yosiki Horiguti.** *Meteorological Society of Japan, Journal*, Ser. 2, 37(1) [unpaged leaf appended to p. 41] Feb. **1959.** port. Bibliog. of Dr. Horiguti's papers. **DWB, DLC**—HORIGUTI died Jan. 17, 1959 at his home in Stonuki-mura, Gifu Prefecture, at the age of 73. He was born Sept. 15, 1885 in Gifu Prefecture; graduate Tokyo Imperial University, July 1911; Engineer of Mie Prefecture, Chief of Tsu Weather Station, and later Chief of the Kobe Weather Station. In 1920 HORIGUTI set up the Kobe Marine Observatory and was Chief Engineer under OKADA, and in 1923 became actual Director (without the title) when OKADA became Director of the CMO in Tokyo. His research in marine meteorology, the Bai-u and typhoons is well known, especially his study on the Okinawa (and Muroto) Typhoon for which he received a prize of the Imperial Academy of Japan. After 1939 he was Director in name as well as in fact of the Marine Observatory. After service in the army in 1942–47, he retired Sept. **1947.** *Subject Headings:* **1. Obituary of Yosiki Horiguti 2. Horiguti, Yosiki.**—*M.R.*

11.7–63 551.5:92

[**Obituary note on**] **Kazimir Frantsevich Levandovskiĭ.** *Meteorologiia i Gidrologiia*, Leningrad, No. 8:63–64, Aug. **1958.** port. **DWB, DLC**—KAZIMIR FRANTSEVICH LEVANDOVSKIĬ, senior investigator of the Hydrometeorological Service, died on May 18, 1958 at the age of eighty-three. His scientific career began in 1899 when he joined the A. S. Volĭkov Main Geophysical Observatory. He carried out research on clouds and on determination of the free and ionic change in cloud moisture, he acted as a consultant to resorts, organized pluviometric stations, participated in experiments on the acclimatization of grain and oil bearing plants in the foothills of Iaila, etc. Since 1932 he had been director of mountain stations at the Institute of Artificial Rain, senior investigator of the Institute of Experimental Hydrology and Meteorology, senior investigator of the Climatology Section of the Principal Directorate

of the Hydrometeorological Service, etc. He was also lecturer at the Moscow Hydrometeorological Institute and the Moscow Hydrometeorological Technical School. *Subject Headings:* **1. Obituary of Kazimir Frantsevich Levandovskiĭ 2. Levandovskiĭ, Kazimir Frantsevich.** —*I.L.D.*

11.7–64 551.5:92

Pshenichnyĭ, A. Ia. and Romanov, N. N., **Lev Aleksandrovich Molchanov: k 80-letiiu so dnia rozhdeniia.** [Lev Aleksandrovich Molchanov on his 80th birthday.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:66–67, Jan. **1959. DWB, DLC**—L. A. MOLCHANOV, professor of physics and agricultural meteorology at the Tashkent Agricultural Institute, was born on Aug. 4, 1878. His earliest work was on the geography and climatology of Central Asia. His climatological studies include the following: **Climate of Uzbekistan, Climatic regions of Central Asia, Climate of Tadzhikistan,** etc. *Subject Headings:* **1. Molchanov, Lev A. 2. Obituary of L. A. Molchanov.**—*I.L.D.*

11.7–65 551.5:92

Manneback, C., [**Obituary of**] **B. van der Pol.** *International Scientific Radio Union, Brussels, Bulletin d'Information*, No. 117:4–9, Sept./Oct. **1959.** 14 refs. **DLC**—The scientific work of B. VAN DER POL, can be subdivided under three headings: theory of experiments on nonlinear oscillations, propagation of electromagnetic waves, applied and pure mathematics. The results of his important work on electromagnetic wave propagation are well known through the propagation curves which were formally accepted at various international conferences. B. VAN DER POL was president of the International Scientific Radio Union (1934–1950), director of the International Advisory Committee for Radio Communication (1950–1956), president of the Technical Committee of the International Broadcasting Organization (1946–1949), vice-president of the Institute of Radio Engineers (U. S.) and a member of several academies of science, etc. He was born at Utrecht (Netherlands) in 1889 and died on Oct. 6, 1959, at the age of 70. *Subject Headings:* **1. Biography of B. van der Pol 2. van der Pol, B. 3. Electromagnetic wave propagation.**—*A.V.*

11.7–66 551.241:92

Zu Alfred Wegeners 75. Geburtstag. [On Alfred Wegener's 75th birthday.] *Polarforschung*, Kiel, Ser. 4, 26(1/2):2–6, **1956,** issued Aug. **1958.** Also: Loewe, Fritz (*Melbourne*), **Alfred Wegener's letze Schlittenreise.** [Alfred Wegener's last sled journey.] *Ibid.*, 26(1/2): 6–10, **1956,** issued Aug., **1958.** 3 tables, 4 ref. Also: Georgi, J., **Zur 25 jährigen Wiederkehr von Alfred Wegeners Grönland-Expedition 1930–31.** [On the 25th anniversary of Alfred Wegener's Greenland expedition in 1930–31.] *Ibid.*, 26(1/2):10–14, **1956,** issued Aug. **1958. DLC**—These 3 papers were written in honor of ALFRED WEGENER. The first one is a general biography with some sidelights on his scientific and adventurous nature. The second paper is devoted to the sledge journey. On Nov. 1, 1930, WEGENER, accompanied by the Greenlander, RASMUS VILLUMSEN, started from station "Eismitte" on his 400 km journey to the "West-station." In May 1931, WEGENER's body was found in his tent 189 km from his destination. Death apparently came suddenly and various theories as to its cause, including exhaustion, heart failure, poisonous gas, etc., are discussed. The weather conditions are considered and some tabulated data are given. Finally, in the third paper the scientific value of WEGENER's expedition is discussed. *Subject Headings:* **1. Biography of Alfred Wegener 2. Wegener, Alfred.**—*W.N.*

BIBLIOGRAPHY—GLOSSARIES—INDEXES

See also: **Hydrology bibliogs.** (Miller), 11.7–363.

11.7–67 551.5:019.941

Sheĭnis, I. M., **Literatura po gidrometeorologii v referativnom zhurnale.** [Literature on hydrometeorology in the "Referativnyĭ Zhurnal."] *Meteorologiia i Gidrologiia*, No. 11:54–55, Nov. **1956. DLC**—The *Referativnyĭ Zhurnal: Geografiia* is published monthly and contains the following sections: **Meteorology and climatology, Hydrology of the land, Oceanography** and **Snow cover, glaciers, and frost.** About 500 abstracts of articles published in Soviet and

foreign literature appear every month. The section on **Meteorology and climatology** begins with general material dealing with official publications, reports of meetings, instructions, etc. and contains the following subsections: General meteorology (structure of the atmosphere, ionospheric radiation, heat regime, etc.); Dynamic meteorology and synoptic meteorology and Climatology (climate formation, climatic classification, etc.) The subsection on Applied meteorology and climatology deals with the effect of climate on man and his activities. The section on **Hydrology of the land** is devoted to soil moisture regime, rivers, lakes, water utilization etc. That on **Oceanography** contains abstracts on the various aspects of physical and biological oceanography. Photostat copies of individual articles which are abstracted can be obtained from the All Union Institute of Scientific and Technical Information of the State Technical Knowledge and of the Academy of Sciences of the U.S.S.R. *Subject Heading:* **1. Meteorology abstracts.**—*I.L.D.*

11.7–68 551.5(02):016(47) 551.4(02):016(47)

†Rigby, Malcolm, **Review of major Russian works in various fields of meteorology, hydrology, and oceanography.** Wash., D. C., March **1959.** 17 p. 14 subject groups, with titles alphabetically by author. Chronological listing of titles in Appendix II. At head of t-p.: American Meteorological Society, Meteorological Abstracts and Bibliography. "Not a definitive edition." Appended: his **Decade of Russian meteorological textbooks and teaching aids.** Wash., D. C., March **1959.** 4 p. **DWB** (M(061) R567re)—About 200 Russian textbooks and technical books in Meteorology, Hydrology and Oceanography are discussed and listed under 14 subject heads: general, dynamic, synoptic, aerology, aviation meteorology and cloud physics, radiation and heat balance, optics, instruments and observations, astrophysics, climatology, micro- and bioclimatology, agricultural meteorology, marine meteorology and oceanography, and hydrology. Appended is a list of transactions of 15 Russian scientific institutes. In the appended paper, the range, quantity and quality of the Russian books and monographs of the past two decades are compared with those in the English language, cited in *Weatherwise* (April, June, October **1955**; June **1956**; April, June **1957**; April **1959**)—both on a year-by-year and on a decade total basis. Very little difference is noted in quantity though in quality there are exceptional instances of both high and low quality on both sides. *Subject Headings:* **1. Bibliography of Russian meteorological textbooks 2. Russian textbooks 3. Oceanography textbooks 4. Hydrology textbooks.**—*M.R.*

11.7–69 011/019 001.815

†Metcalfe, John Wallace, **Information indexing and subject cataloging: alphabetic, classified, coordinate, mechanical.** N. Y., Scarecrow Press, **1957.** 338 p. 114 refs. Price: $6.50. **DLC** (Z696.M58). Review by Lea M. Bohnert in *Science*, 128(3335):1336–1337, Nov. 28, **1959.**—Contents include: 1) Documentation and bibliography; 2) Alphabetical vs. classified indexing; 3) Dictionary, catalog, subject headings, etc.; 4) Classifications, notation; 5) Auxiliary notations and subheadings; 6) Relative indexing, subject headings lists and central catalogs; 7) Mechanical selection and coordinate indexing. *Subject Headings:* **1. Information indexing 2. Subject classification.**—*M.R.*

11.7–70 550.3:551.5:014.3

Rand Corporation, Santa Monica, Calif., **Index of publications.** Sept. **1959.** "Complete revision of the Index, replacing the Sept. 1958 Index." Each section repaged. Contents: Subject index, 81 p. Reports, 18 p. Research Memoranda, 150 p. Papers, 258 p. Translations, 23 p. Author index, 124 p. **DLC**—On p. 28–30 of the Subject Index of this publication are listed about 75 reports in the field of Geophysics (including upper atmosphere and ionosphere, and weather studies). The individual reports, with brief abstracts, are found in their numerical order on subsequent pages. An Author Index (124 p.) is appended. *Subject Headings:* **1. Publication indexes 2. Rand Corporation publications.**

11.7–71 551.5(030.8)

Zamorskiĭ, Aleksandr Dmitrievich, **Opredelitel' atmosfernykh iavleniĭ.** [Guide to atmospheric phenomena.] Moscow, Gosudarstvennoe Uchebno-pedagogicheskoe Izdatel'stvo

Ministerstva Prosveshcheniia RSFSR, **1958.** 79 p. 15 figs. **DLC** (QC880.Z25)—A small pamphlet for popular information about weather phenomena such as rain, snow, glaze, frost, fog, dust, haze, blowing snow, storms, wind, optical phenomena, electrical phenomena, waterspouts, etc. It actually amounts to a systematically, rather than an alphabetically, arranged glossary with amplified definitions and illustrations of each of the phenomena and sub-types thereof. The booklet would be useful for observers or volunteers at secondary stations. *Subject Headings:* **1. Weather phenomena 2. Meteorological glossaries.**—*M. R.*

B. APPLICATIONS

1. AERONAUTICS

See also: **Pilot reports** (Kuo), 11.7–266; **Airplane turbulence obs.** (Lappe et al.), 11.7–302; **Visibility research** (Foitzik), 11.7–390.

11.7–72 551.574.7:629.13

Dickison, R. B. B. (*Royal Canadian Air Force*), **A study of the effect of air-speed on airframe icing.** *Weather*, London, 14(11):347–350, Nov. **1959.** fig., 5 refs. **DWB**—In order to determine the effect of kinetic heating on icing of airplanes at subsonic speeds, the author carried out an experimental flight in icing conditions in an F-86 over Chatham, N. B., on March 4, 1958. The weather observations at the time of the icing trial and the sequence of icing trial events are summarized. MESSINGER's analysis of the equilibrium temperature at the airfoil as a function of air speed and the factor $b=(R_w c_w/fc)$, called the relative heat factor (R_w = unit rate of water catch, lb/h ft^2; c_w = unit heat capacity of water, Btu/lb°F; and fc = unit convection conductance, Btu/h ft^2 °F), is applied to obtain the variation in free stream temperature with increasing air speed (illustrated on a graph). It is shown that in using a simple theory of kinetic heating in relation to ice forecasting, an allowance may be made for air speed with some degree of confidence. *Subject Headings:* **1. Icing of aircraft 2. Air speed effect on icing 3. Chatham, New Brunswick.**—*I.L.D.*

11.7–73 551.574.7:629.13

*Zavarina, M. V., **Fazovoe stroenie oblakov i obledenenie samoletov.** [Phase structure of clouds and icing of airplanes.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 82:26–37, **1958.** 13 tables. **DLC**—The dependence of the icing of airplanes in clouds upon their phase structure was studied on the basis of airplane soundings at Shosseinaia (near Leningrad) and Arkhangelsk. Also the thickness of the icing zone, its intensity, the relationship between air temperature and the form of ice deposit upon the airplane and the relationship between the icing of the airplane and bumpiness in clouds were investigated. In Shosseinaia the probability of icing is 50–60% in winter and 35% in summer. No substantial difference was observed in the probability of icing as a function of synoptic conditions. The highest probability of icing was observed in strato-nimbus clouds of cold fronts and cumulo-nimbus clouds of warm air masses. The probability of icing in clouds is reduced by the presence of crystalline phases of different types. Data are presented showing that icing occurs only in clouds with droplets and in clouds of mixed structure but a large percentage of icing occurs in the former. Icing of airplanes was not observed in crystalline clouds. The largest percentage of solid phase is observed in high stratus clouds; this explains the low probability of icing in these clouds. At temperatures from 0° to −10°C the crystals are encountered rarely in clouds. Most frequently (43%) crystalline structure is encountered at temperatures of −15 to −20°C, and below −20°C it predominates. Most frequently icing zones have a thickness less than 600 meters. Only in clouds of frontal systems Ns-As and cumulus rain clouds does the thickness of the icing zone exceed 600 met. Near Leningrad the mean frequency of opaque and transparent ice was similar and constituted about 90%. White ice very rarely occurred on the airplane. Analogous data obtained for Arkhangelsk are presented and compared with those for Leningrad. Extensive data are presented in tables. *Subject Headings:* **1. Icing of aircraft 2. Shosseinaia, U.S.S.R. 3. Arkhangelsk, U.S.S.R.**—*I.L.D.*

11.7–74 551.551.25:629.13

*Heath-Smith, J. R., **Atmospheric turbulence encountered by Bristol Freighter aircraft in United Kingdom, West Africa and New Zealand.** *Great Britain. Aeronautical Research Committee, Technical Report*, No. 429, **1959.** 17 p. 5 figs., 15 tables, 5 refs. **DWB** (M51 H438at)—Gust accelerations were recorded during 1,500 hrs of flying below 10,000 ft by Freighter aircraft in United Kingdom, West Africa and New Zealand. The gust frequencies in the three regions are compared and the influence of the flight plan on the values recorded is discussed. The average distance between gusts greater than 10 ft/sec, E.A.S. within 1000 ft of the ground, varies from 2 mi in New Zealand to 12 mi in West Africa. Over the sea the distance is greater by a factor of 2 or 3. *Subject Headings:* **1. Gustiness 2. Gust frequencies 3. Atmospheric turbulence.**—*Author's summary.*

11.7–75 551.551:551.557:629.13

Bugaev, V. A.; Dzhordzhio, V. A. et al., **Aerosinopticheskie usloviia boltanki samoletov v sredneĭ Azii.** [Aerial synoptic conditions causing aircraft bumpiness in Central Asia.] *Sredneaziatskiĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 14, **1958.** 44 p. 26 figs., 19 refs. **DWB** (M(055) U581ts)—Results of a study of aerial synoptic conditions causing aircraft bumpiness carried out during 128 flights between Tashkent and Alma Ata by a joint expedition of the Central Aerological, the Tashkent Geophysical Observatory and the Kazakh Hydrometeorological Institute in March, April, May and June 1956 are presented and discussed. The authors introduce an aerial synoptic classification of causes producing aircraft bumpiness which includes thermal, orographic, frontal and dynamic bumpiness, as well as the one caused by advection of cold, "cold pockets" in the middle troposphere and by jet streams. A series of rules for the forecasting of aircraft bumpiness in Central Asia based on the results of the study is given. *Subject Headings:* **1. Bumpiness 2. Synoptic conditions for aircraft bumpiness 3. Central Asia. I. Petrosiants, M. A. II. Romanov, N. N.**—*A.M.P.*

11.7–76 551.594.221:629.135

Robb, J. D.; Hill, E. L.; Newman, Morris M. and Stahmann, J. R., **Lightning hazards to aircraft fuel tanks.** *U. S. National Advisory Committee for Aeronautics, Technical Note*, 4326, Sept. **1958.** 58 p. 28 figs. (incl. photos), table, 2 refs., 58 eqs. **DLC**—The hazards of lightning strokes to aircraft fuel tanks were investigated in artificial-lightning-generation facilities constructed to duplicate closely the natural-lightning discharges to aircraft. There is a primary hazard whenever there is direct puncture of the fuel-tank wall, whereas the ignition of fuel by hot spots on tank walls due to lightning strokes is unlikely. Ninety percent of the natural-lightning strokes recorded have occurred in the temperature range of $-10°$ to $+10°$C, where many of the jet fuels are flammable but where aviation gasoline is overrich. Also, 10% of the strokes recorded have been to the wings, which are the principal fuel-storage areas for modern aircraft. *Subject Headings:* **1. Lightning strokes on airplanes 2. Aircraft damage 3. Artificial lightning studies 4. Fire danger to aircraft.**—*NACA*

11.7–77 551.551.5:551.573:629.139.5:614.84

Lowell, Herman H. (*Lewis Res. Center Cleveland*), **Dispersion of jettisoned JP-4 jet fuel by atmospheric turbulence, evaporation, and varying rates of fall of fuel droplets.** *U. S. National Aeronautics and Space Administration, Technical Note* D-84, Oct. **1959.** 25 p. 6 figs., 6 refs., 7 eqs. **DWB** (629.1308 U585nD)—Ratios of jettisoned JP-4 fuel (in droplet form) to air were calculated for four weather situations: a warm, windy day; a warm, quiet day; a cold, windy day; and a cold, quiet day. Fuel-air ratios were much lower than the lean flammability limit for such fuels (0.035) even for falls of the order of 300 ft. It was concluded that fire hazards associated with the presence of air-borne droplets will, in general, be negligible. (Ground accumulation of liquid fuel—and possible hazard associated therewith—was not, however, considered in this study.) The calculation techniques are indicated. *Subject Headings:* **1. Air-borne fuel droplets 2. Atomization of fuels 3. Fire danger to aircraft 4. Turbulence effects on jettisoned aircraft fuels.**—*NASA.*

11.7–78 551.589.5(689.1)

*Rhodesia & Nyasaland. Meteorological Service, **Simultaneous occurrences of specified visibility ranges and specified ranges of the height of base of the lowest cloud layer covering**

more than 4/8 of the sky at Salisbury airport, Southern Rhodesia. Its *Climate Information Sheets*, No. 12, Aug. **1959.** 6 p. mostly tables. Mimeo.—The data consisting of 4 sets of tables, give the frequency of simultaneous occurrences of specified low cloud and visibility conditions at Salisbury Airport, Southern Rhodesia (lat. 17°55′S, long. 31°06′E, elev. 4904 ft above M.S.L.). The period covered is from July 1, 1956 to July 30, 1959, and the specified conditions comprise the simultaneous occurrence of: a) visibility 2½ mi or less; b) low cloud amount 5/8 or more; c) height of base of low cloud 3000 ft or less. *Subject Headings:* **1. Ceiling-visibility data 2. Airport visibility 3. Salisbury Airport, Southern Rhodesia.**—*I.S.*

11.7–79 551.556.3 551.558:629.135.15(234.27)

La prospection aérologique du pays: une semaine de vol d'onde dans les Vosges. [Aerological prospecting of the country: a week of wave flight in the Vosges.] *Les Ailes*, Paris, 39(1712):10, Jan. 17, **1959. DLC**—The aero-club of eastern France sent a Bregnet-9as glider and its team at Colmar to investigate the possibilities of lee wave flights over the Vosges Mountains. Results of the different flights made on 12, 13, 14, 15, 16, 17 and 18 Dec. 1958 show the existence of up-draft waves over the Vosges. *Subject Headings:* **1. Glider flights 2. Lee waves 3. Updrafts 4. Bregnet-9as glider 5. Vosges Mts., France.**—*A.V.*

11.7–80 629.135.15

Kensche, Heinz, **Die Entwicklung zum modernen Segelflugzeug.** [Development of the modern sailplane.] *Umschau*, 55(7):193–195, April 1, **1955.** 4 figs., 2 tables. **DLC**—Discussion of span and lift of high-load sailplanes, and heights reached. A height of 20,000 m is regarded as possible. *Subject Heading:* **1. Sailplanes.**—*C.E.P.B.*

11.7–81 598.2:591.52

Sauer, E. G. F., **Celestial navigation by birds.** *Scientific American*, N. Y., 199(2):42–47, Aug. **1958.** maps and illustrations. **DLC**—World zoologists and investigators of world migration of birds are convinced from their studies that birds rely mainly on celestial navigation —the sun by day and the constellations by night. The presence of meteors in the sky or the overcast of thick clouds in the heavens momentarily confuse these birds in their transcontinental flights. This paper contains research on these salient facts as observed under an artificial sky. *Subject Headings:* **1. Bird navigation 2. Celestial navigation by birds.**—*N.N.*

11.7–82 551.5:061:629.135.2

Schweitzer, H., **Der Flugwetterdienst für den Luftverkehr mit Düsen-Flugzeugen.** [Air weather service for jet plane transportation.] *Umschau*, Frankfurt a.M., 59(5):129–132, March 1, **1959.** 4 figs., 4 refs. **DLC**—Safe jet plane navigation and economical operation are mainly dependent on the meteorologist and his forecasting services. Some general problems arising from the 800–1000 km/hr speed include 4–5 times higher fuel consumption, flight altitudes at 10–12 km, temperature forecasts of an accuracy of 3°C. The aerological observations must be ready for transmission in 10 min.; a new weather forecast every 30 min. from all airport weather stations within 900 km is required. Some instrumental safety measures and design consideration of jet planes directly related to meteorology are also considered. *Subject Heading:* **1. Aeronautical meteorological services.**—*W.N.*

11.7–83 551.5:629.13:061.1(73)

U. S. Weather Bureau, **Modernizing the aviation weather service: a program to meet needs of the jet-age.** Wash., D. C., **1959.** 61 p. figs. **DWB** (M:629.13 U587mo)—The plan presented here provides for an orderly, systematic modernization of the whole Aviation Weather Service. The endeavor of the Weather Bureau, in the program outlined in this plan, is to reap every benefit from technological progress. Mechanization, electronic computation, high-speed communications, and the latest data processing and forecasting techniques are incorporated. Seven project groups, each representing fields of specialized operation, are planned for completion by the end of the 1964 fiscal year, and details regarding them are given. For each project there is a brief discussion of the background and problem followed by a statement of the action planned. Several graphs illustrate the plan. *Subject Heading:* **1. Aeronautical meteorological services.**—*I.S.*

2. AGRICULTURE

See also: **Agronomy texts,** 11.7-6; **Control of plant environment,** 11.7 42; **Photoperiodism** (Lona), 11.7–384.

11.7–84 551.586:63

Sapozhnikova, S. A., **Agroklimaticheskie pokazateli.** [Agroclimatic indices.] (In: U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, **Voprosy agrometeorologii,** ed. by F. F. Davitaia and M. S. Kulik. Moscow, **1958.** p. 66–69.)—The establishment of quantitative relationships between agricultural factors and climatic conditions requires its expression in the form of agroclimatic indices. In practical application of climatic data these indices are used, not only in determining the climatic needs of agricultural elements of production, but also in describing the climate itself. A distinction is made between agroclimatic and agrometeorological indices. The former are used in evaluating agroclimatic resources and are used in planning agricultural production over a period of several years. The latter are employed in determining the effect of weather conditions of a given year upon agriculture; they are used in agrometeorological information and in forecasts for current planning. The fundamental unit of time in agroclimatic indices is a month, season or entire growth period; in agrometeorological indices it is either a pentad or decade. The agroclimatic indices developed by Soviet climatologists include the index of thermal resources—the temperature sum for a period with a temperature above 10°C; the moisture indices take into account incoming and outgoing moisture; the latter are evaluated either by air temperature or moisture deficit. The determination of agroclimatic indices involves the use of individual years; but the individual variations as a result of different weather conditions in each year requires statistical criteria of accuracy, such as the deviation of the results of actual computation from the total (*t*-test). In determining agroclimatic indices agrotechnical conditions must be uniform. Agroclimatic indices can be used satisfactorily only if the climatic characteristics are complete. The use of climatic data and the agroclimatic indices in long range forecasts (5–10 yrs) are discussed. *Subject Headings:* **1. Agroclimatological indexes 2. Agrometeorological indexes.**—*I.L.D.*

11.7–85 551.586:633.491

*Nikiforova, A. T., **Opyt izucheniia sviazi urozhaĭnosti kartofelia s klimaticheskimi usloviiami mesta vozdelyvaniia.** [Attempt at a study of the relation between potato yield and the climatic conditions in the area.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Aeroklimatologii, Trudy,* No. 6:64–77, **1958.** 4 figs., 6 tables, 18 refs. **DWB**—The author investigated the relationship of the yield of potatoes to meteorological elements and the determination of the climatic boundaries of possible potato cultivation areas differing in their yield. The index of the heat supply for the growth and development of potatoes was the mean daily air temperature for the period June–July–August and the heat supply was characterized by the hydrothermal coefficient (the ratio of precipitation to temperature according to G. T. Selianinov). A relationship was established between the yield of potatoes for the years 1940, 1950, 1954 and 1955 and air temperature on the one hand and the hydrothermal coefficient on the other. Data are presented to show that stable and high yields of potatoes are obtained under the following complex of meteorological conditions, viz: the amount of precipitation during June, July and August is equal to 230 mm; the air temperature during the same period is 17–18°C; during minimum temperature conditions (for June–August, 13.5°C) precipitation of 150 mm for the period June–August and a hydrothermal coefficient of 1.0 for the same period are adequate for obtaining a yield equal to the average for the U.S.S.R. The moisture balance for the period June–August is a decisive factor in the potato yield. A map of the calculated yield of potatoes in the U.S.S.R. is presented and the computed and actual yield of potatoes are compared. *Subject Headings:* **1. Potato yield 2. Climate-potato yield relationships 3. U.S.S.R.**—*I.L.D.*

11.7–86 551.586:633.15

*Fedoseev, A. P. and Beloborodova, G. G., **Agroklimaticheskie usloviia vozdelyvaniia kukuruzy v severnoĭ polovine Kazakhstana.** [Agroclimatic conditions for maize growing in the northern part of Kazakhstan.] *Alma-Ata. Kazakhstan. Kazakhskiĭ Nauchno-Issledova-*

tel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy, 8:3–27, **1957.** 3 figs. (1 fold.), 18 tables, 9 refs. **DWB**—The authors present a comprehensive analysis of the climatic characteristics of the northern half of Kazakhstan and their suitability for successfully growing maize. On the basis of extensive meteorological and phenological data, the authors discuss the soil temperature, moisture and frost regime in relation to sowing; the heat and moisture requirements of maize during the various stages of growth and development and the agroclimatic conditions for obtaining maize harvests. A map showing agroclimatic zones of the northern half of Kazakhstan for maize cultivation and numerical data on heat and moisture requirements, etc. are presented. *Subject Headings:* **1. Maize cultivation 2. Climatic effects on maize 3. Kazakhstan S.S.R.**—*I.L.D.*

11.7–87 551.586:633.2

Fedoseev, A. P., **Agrometeorologicheskie usloviia formirovaniia urozhaia pastbishch, osnovy ikh otsenki i prognozirovaniia.** [Agrometeorological conditions affecting pasture yields, principles of evaluating and forecasting.] (In: U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, **Voprosy agrometeorologii,** ed. by F. F. Davitaia and M. S. Kulik. Moscow, **1958.** p. 51–57. 4 tables, 17 refs.)—Rather good correlations exist between the average harvests of pasture meadows and mean precipitation during dry, moderately wet and wet years in the various zones of the U.S.S.R. In excessively wet meadows the harvest declines. In the humid forest zone, the relationship between hay yield and precipitation holds only for dry meadows. In humid meadows the yield is correlated either with air temperature during the summer months or with moisture deficit. In the dry zones with spring maximum of precipitation the grass harvest depends upon soil moisture supply during spring; hence it is possible to forecast 1.5–2 months in advance the condition for the formation of the harvest of the pastures. During stable moisture conditions the depth of soil moisture is a direct index of soil moisture supplies. Most grains and grasses resume growth at an air temperature of +3° to +5°C. Zonal differences in mean dates of early growing pasture vegetation in the Kazakhstan lowlands reach 45 days. In the southern regions of this republic the vegetation period may vary from December–February to April 10 because of winter instability. The dynamics of the growth of plants on meadows and pastures in relation to habitat and weather conditions is characterized by zonal and local features. On humid meadows of the forest zone the maximum harvest occurs after the period of maximum temperature; on dry meadows in this zone the maximum harvest occurs earlier. In the mountains the maximum harvest coincides with the period of maximum air temperature, etc. The intensity and date of withering of pasture plants depends upon biological properties of the soil and meteorological conditions; the withering can be either even, mosaic, in layers, gradual and rapid. The supplies of available moisture in the soil can serve as a criterion for evaluating the growth of after grass on pastures and hay meadows of arid zones. On the basis of the number and succession of humid and dry decades, the condition of pasture grass stands can be evaluated; this evaluation of the condition of grass vegetation according to season involves the establishment of five types which are listed and illustrated with examples. The annual variation of the mean coefficient of moisture and its variation with relief in the Kazakh S.S.R. (given in a table) are discussed. Empirical formulas for computing soil moisture supplies on pastures for agrometeorological forecasts are presented. *Subject Headings:* **1. Pastures 2. Moisture effects on pasture yields 3. Forecasting soil moisture 4. Kazakhstan S.S.R.**—*I.L.D.*

11.7–88 551.586:551.524.36:581.46:634

Parovshchikov, V. Ia., **Otritsatel'nye temperatury i sroki zatsvetaniia i plodonosheniia rasteniĭ.** [Negative temperatures as affecting the dates of flowering and fruiting.] *Priroda*, Moscow, 7:126, July **1959. DLC**—The particularly cold spring and summer of 1958 in the region of Arkhangelsk characterized by two snowfalls in June and July, and a temperature drop to −4°C, is discussed. The mean decade temperatures in spring and summer were considerably below normal. This caused a retardation of 9–10 days of the flowering and a 13 day retardation of the fruiting of plants in August and September. *Subject Headings:* **1. Temperature effects on flowering and fruiting 2. Fruit cultivation 3. Arkhangelsk, U.S.S.R.**—*A.M.P.*

11.7–89 551.586:551.524.36:551.525:633.1

Lichikaki, V. M., **Otsenka agroklimaticheskikh uslovii perezimovki ozimykh na territorii Ukrainskoĭ SSR.** [Evaluation of the agroclimatic conditions for the wintering of crops in the Ukrainian S.S.R.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 14:10–23, **1958.** 8 figs., 2 tables, 4 refs., 2 eqs. **DWB**—In the Ukrainian S.S.R. most of the destruction of winter crops results from the combination of meteorological elements producing freezing, which occurs not only during low temperature but also during the succession of extensive thaws and frosts. An attempt is made to establish quantitative relationships between the frost resistance of winter crops and agroclimatic conditions by using soil temperature at the depth of shoot growth, height of snow cover, warming and destruction of winter crops. Also the critical temperature of winter wheat (limit of frost resistance of the plant) was established for a number of districts in the Ukrainian S.S.R. Maps showing the minimum soil temperature at the depth of shoot growth, frequency of monthly mean maximum height of snow cover and frequency of positive mean daily air temperature for 20 days and more, destruction of winter wheat, and the classification of the Ukraine on the basis of the complex climatic index of wintering of winter crops, etc. are presented. A quantitative index of the complex of climatic elements of thawing, snow cover and soil temperature is established, namely $K = H \cdot Q\text{-}T$ where Q = frequency (%) of years with thawing of more than 20 days with positive mean daily air temperature, H = frequency (%) of years of mean decadal maximum height of snow cover more than 20 cm and T = frequency (%) of years with absolute minimum of soil temperature at depth of shoot growth −12°C and lower. The relationship between the index of wintering (K) and destruction of winter crops (S) plotted in a graph shows a gradual decrease in destruction from west to east according to geometrical progression. The classification of the area on the basis of the climatic conditions of wintering was verified on the basis of data for 1955–1956. The complex meteorological index was computed by $K^1 = H^1Q^1/T^1$ where H^1 = height of snow cover in cm, Q^1 = sum of mean daily positive air temperature in the thawing period and T^1 = absolute annual minimum of air temperature at depth of shoot growth. The relationship between S^1 (plant destruction) and K^1 showed a declining geometrical progression. The data for this year are presented on maps and in a table. *Subject Headings:* **1. Winter wheat cultivation 2. Temperature effects on winter wheat 3. Ukrainian S.S.R.** —*I.L.D.*

11.7–90 551.579.5:634.58:581.116

Wormer, Th. M. and Ochs, R., **Humidité du sol, ouverture des stomates et transpiration du palmier à huile et de l'arachide.** [Soil moisture, opening of stomata and transpiration of the oil palm tree and peanut.] *Oléagineux*, Paris, 14(10):571–580, Oct. **1959.** 14 figs., 15 refs. **DLC, DA**—A study is presented on the behavior of the oil palm tree and groundnut with respect to soil moisture. The authors describe briefly the experimental methods used. They examine the multiple relations existing between the water balance factors: transpiration, soil moisture, opening of the stomata and water deficit in the leaf tissues. Transpiration of palm tree and groundnut remains constant during soil desiccation up to a critical value of soil moisture. This critical value is dependent on the evaporative power of the air. Above the critical value, the transpiration decreases progressively up to the wilting point. The evolution of the opening of the stomata during desiccation runs parallel with transpiration variations. Daily and seasonal changes in the opening of stomata show the influence of soil moisture, of transpiration intensity and of light intensity on the transpiration regulation of the oil palm tree and groundnut. Transpiration is bound to the deficit of atmospheric water pressure. *Subject Headings:* **1. Transpiration of trees 2. Soil moisture 3. Water balance of soil.**—*A. V.*

11.7–91 551.584.9:631.544

Spoelstra, P. A., **De klimaatkassen van het I.B.S.** [The air-conditioned glass houses of the Institute for Biological and Chemical Research on field crops, Wageningen.] *Wageningen. Landbouwhoogeschool. Instituut voor Biologisch en Scheikundig Onderzoek van Landbouwgewassen, Jaarboek 1957* (*Mededelingen* No. 22):131–138, **1958.** 3 figs. English summary p. 138.—A description is given of a glass house without windows. Cooled air can be vertically injected into the glass house through two air ducts along the whole length of the side walls. The air conditioned rooms contain heaters (warm water from central heating) and a cooling system

with well-water (temp. 10–12°C, capacity 8000 l/hour) or mechanical cooling (freon). Air humidity can be raised by spraying water through nozzles in the air ducts. The roofs can be sprayed with water; no screens are used. In this way all shadowing construction is avoided. Heating, cooling and moistening are automatically controlled. The system can work with complete inside air circulation but sifted fresh air can be drawn in as required by adjusting valves. In this way air pressure in the glass house rises slightly which prevents the entry of dust and pests. The light transmittance is 78% compared with 61% in a glass house of traditional construction. On hot days the effect of the well-water cooling is satisfactory. On a sunny day with a screen temperature of 30.5°C a compartment without conditioning and maximum (forced) ventilation reached 34.5°C. A similar compartment with well-water cooling and some air moistening was 28.5°C. With additional roof spraying temperature sank to 25.5°C. For roof spraying iron-free water must be available. *Subject Headings:* **1. Greenhouse microclimate 2. Air conditioning of greenhouses.**—*Author's abstract.*

11.7–92 551.501.9:63

†Newman, James E. and Shaw, R. H., **The agricultural weather station: its instruments, observations, and site requirements.** *Wisconsin. Agricultural Experiment Station, Madison, Bulletin*, No. 537, June **1959.** 31 p. 12 figs., 37 refs. **DA**—The present report summarizes studies made under the direction of the North Central Regional Technical Committee, NC-26, on "Weather information for agriculture." It is primarily concerned with setting forth the necessary observations, instrumentation, and exposure requirements of an agricultural weather station. The general recommendations may be summarized as follows: 1) that the site be representative of general crop-climate conditions, 2) that observations be of moderate accuracy but very reliable, 3) that instrumentation be of a simple, rugged design, 4) that observations be easy to obtain and record, 5) that data be expressed in a simple gross manner on a daily, weekly, monthly, or seasonal basis, 6) that routine and special observations be held to a daily, weekly, monthly, or seasonal basis, 7) that any special attention necessary for instruments be on a daily, weekly, monthly, or seasonal basis. The report is nicely illustrated by photographs showing different instruments in operation. *Subject Headings:* **1. Agrometeorological stations. I. Suomi, V. E.**—*I.S.*

3. FORESTRY—FIRE WEATHER

See also: **Forest hydrol.** (Richard), 11.7-216; **Hurricane damage to forests** (Lesage), 11.7–284; **Forest effects on snow cover** (Kopanev), 11.7–319; **Afforestation in irrigated regions** (Mirkin), 11.7–320; **Climate and tree growth, Finland** (Landa), 11.7–375.

11.7–93 551.586:634.9:582.632

†Cottam, Walter P. (*Utah Univ.*); Tucker, John M. (*Univ. of Calif., Davis*) and Drobnick, Rudy (*Utah State Fish and Game Dept.*), **Some clues to Great Basin postpluvial climates provided by oak distributions.** *Ecology*, Durham, N. C., 40(3):361–377, July **1959.** 6 figs. (incl. photos), 5 tables, 26 refs. **DWB, DLC**—On the basis of the recent discovery of a hybrid oak within the Great Basin in the foothills of the Oquirrh Mountains, the authors analyzed in detail the temperature of the Postpluvial's Altithermal Age. The ecology and distribution of *Quercus turbinella* and *Quercus gambelii*, which give rise to the hybrid, the origin and distribution of relictual hybrids in the Great Basin and areas of present distribution of oak hybrids are described. A brief account of the historical aspects of the Neothermal age provides evidence explaining the oak distribution within the Great Basin. The warm moist climates of the Anathermal furnished ideal conditions for the rapid migration of Gambel oak and the great warmth of the Altithermal period provided the only possible conditions for the Basin migration of the live oak: *Quercus turbinella*. In Medithermal times a return to a climate cool enough to regenerate glaciers in high mountains could have sufficed to exterminate the live oak yet warm enough at the base to have spread the hybrid. Continuous temperature recordings provided analysis of temperature prevailing at the northern relictual hybrid locations in the Great Basin, the northernmost locations in the Great Basin, the northernmost locations where *Quercus turbinella* and *Quercus gambelii* are hybridizing at present, an area where *Quercus turbinella* reaches its optimal development and an optimal location for *Quercus gambelii*. The data obtained indicate that the temperature factor responsible for the disappearance of *Quercus*

turbinella from the Great Basin with the onset of the present climate was not a general decrease in temperature throughout the year nor colder winter minimal temperatures but a significant drop in total warmth from the fall to early spring. The average elevation of relictual hybrids in the Great Basin is about 5400 ft; they are encountered seldom very much below this height. Gambel oak flourishes in relative abundance down to 500 ft below this altitude. The peculiar altitudinal distribution of the hybrids appear to be a consequence of temperature inversions. *Subject Headings:* **1. Postpluvial climates 2. Forest ecology 3. Oak trees 4. Great Basin, Utah.**—*I.L.D.*

11.7–94 551.586:634

Obmiński, Z. (*Polish Forestry Res. Inst., Warsaw*), **Ökoklimatische Untersuchungen im polnischen National Park von Białowieza.** [Ecoclimatological investigations in the Białowieza National Park.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Netherlands, Vol. 2 (Pt. 2), **1958.** 2 p. **DWB**—In the Białowieza National Forest, research is being conducted on the climatic and hydrological importance of different plant associations of local forest types. The hydrometeorological network consists of 5 similarly equipped forest stations and one station in the open country. Detailed microclimate observations were made and these were correlated with phytosociologic, pedologic and phytopathological observations. The results of ten years of study indicate that in addition to the important ecoclimatologic role of the plant cover the particular structure of the forest bed with its characteristic microclimate is important to the plant world. The climatic conditions in the forest are sharply differentiated so that four microclimates are distinguished between the upper surface of the stand and low lying root zone. The microclimatic conditions in contrast to the edaphic factors are extremely labile and their variations influence woody growth in the forest stand, the struggle for existence among plant species, the disease sequence of various plants, etc. The correlation between so-called gradation and microclimatic conditions in the forest is difficult as the biocenotic conditions are usually very complex and the climate acts indirectly upon the life processes in the forest. *Subject Headings:* **1. Ecoclimatology 2. Forest microclimatology 3. Białowieza National Forest, Poland.**—*I.L.D.*

11.7–95 551.501.9:551.506.8:634.94

†Chalupa, Vladímír, **Příspěvek k problematice síťových fenologických pozorování lesních dřevin.** [Contribution to the problem of phenological network of forest trees.] *Meteorologické Zprávy*, Prague, 11(4/5):102–108, **1958.** 10 figs., 31 refs. Czech., Russian and German summaries p. 102. Also: Matějka, Vladímír, **Několik poznámek k nové organizaci síťových fenologických pozorování lesních dřevin.** [A few notes on the new organization of phenological network observation of forest trees.] *Ibid.*, 12(2/3):58–59, **1959.** 14 refs. Russian and German summaries p. 58. Also: Kurpelová, Margita, **K reorganizácii staničnej siete fenologickej služby.** [On the reorganization of the station network of the phenological service.] *Ibid.*, p. 62–63. 4 refs. **DWB, DLC**—Chalupa points out the unsatisfactory quality of phenological data on forest trees. A few new principles of phenological observation in the newly established forest network observations are discussed. Dates of phases are recorded for several numbered trees; solitary trees and sunlit trees at the edge of the forest are observed. Every effort is made to eliminate subjective judgment and for some phases more accurate methods are used than visual observation. It is recommended that stations of different order be established to improve the quality of statewide network observations. *Subject Heading:* **1. Forest phenology.**—*Transl. of author's abstract.*

11.7–96 551.506.8:634.94 551.585

*Koelmeyer, K. O., **The periodicity of leaf change and flowering in the principal forest communities of Ceylon.** *The Ceylon Forester*, Colombo, 4(2):157–189, July/Dec. **1959.** 4 figs., 9 tables. **DLC**—A study is presented on leaf-fall, reflush, flowering and fruiting of various tree-species in the tropical wet evergreen forest of Ceylon. The climate falls into five types according to the Thornthwaite classification: 1 perhumid (no water deficit, megathermal with equable temperature) and 4 humid types (little or no water deficit, megathermal with equable temperature). The tree-species are subdivided into four classes, depending primarily on the intensity of depletion of the crown: obligate deciduous, facultative deciduous, semi-evergreen

and evergreen. Temperature, rainfall, humidity, potential evapotranspiration, water surplus and deficit, and daylight data are presented in tabular form and compared with data of leaf-fall, reflush, flowering and fruiting. Phenological observations were recorded from 1942 to 1951 in 10 plots. The leaf change behavior of the evergreen species shows an asynchronous character and seems to be bound to internal physiological conditions and to the climate in such a way that their relative influence cannot be discerned. The deciduous species are more regular (10 to 13 months cycle) and are particularly sensitive to climatic changes. Leaf-fall generally takes place after low humidity and/or low rainfall, while reflush occurs often after high humidity and/or rainfall. Flowering shows an irregular periodicity. Maximum flowering is regularly preceded by low rainfall and low humidity. The critical limits are 78% relative humidity and 6.0 in. monthly rainfall. The tendency to a cyclic behavior in flowering so that it does not take place every time the climatic conditions reach the critical limits indicates the presence of an internal physiological rhythm which is different for the various species. The occurrence of definite seasons but of irregular periodicity which occurs under constant conditions of humidity and/or rainfall indicate the climatic control of this periodicity. The last part of the article gives phenological notes for 33 species in the wet evergreen forests. *Subject Headings:* **1. Forest phenology 2. Climatic influences on periodicity of leaf change and flowering 3. Thornthwaite's classification.**—*A. V.*

11.7–97 551.588.86:551.579(43)

Kern, H., **Abflussvorgang und Wasserhaushalt eines typischen Waldflusses, dargestellt am Beispiel des Schwarzen Regen.** [The process of runoff and the water economy of a typical forest stream, as exemplified by the Regen River region.] *Arbeitskreisr "Wald und Wasser," Mitteilungen*, Coblenz, No. 3:55–62, **1959.** 10 figs., table, 4 refs. **DWB** (M:634.9 A664mi)—The hydrology of the Regen River including the mean monthly discharges in the inflow area of the Regen River for the period 1931–1952, the mean annual precipitation distribution for 1931–1955, precipitation and discharge in individual years for this period, etc. is discussed with the aid of data presented in graphs and tables. The relationship between climatic fluctuations and the water regime is examined. *Subject Headings:* **1. Forest influences on water regime 2. Hydrology of the Regen River 3. Climatic influences on water regime 4. Regen River.**—*I.L.D.*

11.7–98 551.585:634.94 551.586:581.143

van Steenis, C. G. G. J. (*Rijksherbarium, Leiden, Netherlands*), **Rejuvenation as a factor for judging the status of vegetation types: the biological nomad theory.** (In: UNESCO, **Study of tropical vegetation: proceedings of the Kandy Symposium, Kandy, Ceylon, March 1956.** Paris, UNESCO, **1958.** p. 212–218. bibliog. p. 218 (8 refs.). French summary p. 216). **DWB** (M86:580 U581st)—The rejuvenation of a tropical rain forest is compared to the growth of an organism. Plants of different climatic regions regenerate differently. Examples discussed include the ecological species that are stationary or nomadic. *Subject Headings:* **1. Tropical rain forests 2. Climatic effects on plant regeneration.**—*N.N.*

11.7–99 551.585:634.94(94)

Webb, L. J. (*Div. Plant Indus. Sci. and Indus. Res. Org., Australia*), **Note on the studies on rain forest vegetation in Australia.** (In: UNESCO, **Study of tropical vegetation: proceedings of the Kandy Symposium, Kandy, Ceylon, March 1956.** Paris, UNESCO, **1958.** p. 171–174. French summary p. 174.) Note: "Summary of ecological surveys of Australian rain forests, to be published in the *Australian Journal of Botany.*" **DWB** (M86:580 U581st)—Pts. I and II contain discussions on the significance of rain forests and their classification. Pts. III and IV give the distribution of rain forests in Queensland and their botanical fitness; and Pt. V covers the soil and climatic processes. *Subject Headings:* **1. Rain forest climate 2. Tropical vegetation 3. Australia.**—*N.N.*

11.7–100 551.5:632.187:634.9

*§Countryman, Clive M. and Schroeder, Mark J., **Prescribed burn fireclimate survey 1–57.** *U. S. Forest Service. California Forest and Range Experiment Station, Technical Paper*, No. 29, Dec. **1958.** Also **Survey 2–57,** *Ibid.*, No. 31, April **1959, Survey 3–57** and **Survey 4–57,** *Ibid.*,

No. 34 and 35, July 1959. About 18 p. each. photos, figs., tables. **DWB** (634.9 U585te)—Four thorough surveys of effects of weather conditions on controlled forest or brush fires were made in 1957 with full instrumentation and a complete analysis of conditions, topography, etc. The first (reported in Survey 1–57) was a study of the effects of fire on wind patterns on the lee side of the fire (on the west slope of the Sierra Nevada, 24 mi NE of Fresno, at 900–1500 ft elev.) on July 13, 1957. Observations were begun on July 10 on conditions summarized. An increase was noted in the wind speed on the lee side (ahead) of the fire near the head of a canyon. This may explain the "blowtorch" effect often observed at the head of a ravine. The second Survey (2–57) was made on the Adams Ranch in the west foothills of the Sierra, 15 mi SW of Sonora, Calif., but on an east facing slope 600–1200 ft elev. The purpose of the study was to analyze air flow conditions on the lee side of a ridge at right angles to the prevailing wind. Fire behavior followed the wind pattern shown in the survey. A firewhirl developed in an area where vertical eddy circulation was found. Study 3–57 was made on the Ford Ranch in Lake County, 150 mi N of San Francisco, Calif., and 60 mi inland from the Coast, on an east facing slope. The object was to study downslope daytime winds frequent in the general area. The winds every afternoon were stronger than expected with usual upslope thermal winds. Wind pattern controlled the fire behavior pattern rather than vice versa. The 4th Survey (4–57) was made from Sept. 4–20, 1957 on the Gunn Ranch, 70 mi W of Sacramento, for 2 mi along SW side of Brushy Canyon on W slope of the Vaca Mts. The purpose was to study mountain-valley or canyon winds and their short period vs. long period effects on fire behavior. It was found that classic patterns appear only when averaged over one hour or more, but fire behavior followed more along lines of short period patterns which were quite different from "normal" flow. The integrated effect of all environmental factors that control fire behavior, and not any one or two factors, must be considered. The general synoptic patterns of weather, including upper air conditions, vertical gradients, etc. must also be considered. Not only stationary instruments, but mobile units were employed in the surveys. The reports give all details of sites, topography, wind patterns, temps., humidity, 500 mb synoptic charts (in Study 3), profiles of wind and temp. etc., and photos of smoke patterns from the prescribed fires. Expected wind patterns as well as observed winds are shown on topographic charts. Effects of fires on air temp. are also shown in tables. *Subject Headings:* **1. Fire behavior studies 2. Prescribed burning surveys 3. Fire weather investigations 4. California.**—*M.R.*

4. MEDICINE AND HEALTH

See also: **Radioactivity effects on leukemia** (Roubault et al.), 11.7-117; **Atmos. pollution and health,** 11.7–270; **Ionization effects on human organisms** (Dussert, Bergerac), 11.7–271; **Föhn sickness** (Obenland), 11.7–316.

11.7–101 551.515.8:551.555.3:312.2

§Kuhnke, Wolfgang (*Hamburg*), **Kann man von einer Föhnwirkung in Norddeutschland sprechen?** [Can one speak of a föhn effect in Northern Germany?] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:117–126, **1958.** 7 figs. **DWB**—Using November 1955 as an example, the author presents data for Paris, various cities in Germany and Austria on the daily frequency of complaints of headache, cardiac and circulatory disturbances, mortality and suicides, the 1σ, 2σ and 3σ (σ—sigma) increases and juxtaposes to these daily value, the detailed course of daily weather for the same period. The general weather situation over the entire area, including the air mass incursions, various convergence and divergence conditions, air temperature variation, etc. are described with the aid of synoptic charts. An analysis of the mortality data for Nov. 1955 shows that increases of mortality occurred in Hamburg, Hannover, Cologne, Munich and Berlin during the incursion of tropical air. This increase occurred when the frontal zone from northwest to southeast over this area was situated in the upper troposphere on the eastern side of the tropical air incursion. The second increase coincided with the beginning moist unstable upglide in the region of the southwest to northeast frontal zone. Similarly in Paris and in the Alpine region the mortality rates increased with the analogous weather situations. The weather situations for west and north Germany correspond to that described as föhns in the Alps. It differs meteorologically from föhn in that

tropical air incursion is displaced westward. The significance of such a weather situation for North Germany is indicated by a graph showing the sudden rise in the daily incidence of disease for Hamburg in November as compared with Sept. and Oct. Also statistical analysis of suicide rates for Hamburg during 1950–1952 showed a significant increase of tropical southern air. These weather related biological phenomena are not associated with föhn phenomena in northern Germany. In fact in the so-called föhn regions it is possible that föhn is not uniquely associated with the commonly föhn-induced biological events. The use of the term "free föhn" is questioned on meteorological grounds. *Subject Headings:* **1. Frontal effects on mortality 2. Analogues 3. Frontal-föhn effect analogues 4. Paris, France 5. Northern Germany 6. Austria.**—*I.L.D.*

11.7–102 551.586:551.555.3:612.12

Zürcher, Paul, **Örtliche meteorologische Einflüsse auf die Gerinnungsvalenz.** [Local meteorological influences on blood coagulation.] *Gynaecologia*, Basel, 146(4):340–342, April **1958. DNLM** —According to research carried out at the Cantonal obstetrical clinic at Coire, the coagulation index seems to increase before the arrival of föhn. This is especially true for persons with labile vegetative nervous systems, less for the pycnoides. *Subject Headings:* **1. Föhn effects on blood clotting 2. Blood clotting.**—*A.V.*

11.7–103 551.515:611.24:616–005

Sandritter, W.; Becker, F. and Langenberg, J., **Die Abhängigkeit der Lungenembolie von Wetter.** [Influence of weather conditions on lung-embolism.] *Leben und Umwelt*, Basel, 16(3):139–140, March **1959. DA.** Reprinted from *Klinische Wochenschrift*, 35:1176, **1957.**— A study is presented on the effect of weather on lung-embolism. The investigations were made by the Pathological Institute of Senckenberg attached to the Frankfurt a.M. University in collaboration with the Medico-Meteorological Research Institute of the German Meteorological Research Institute of the German Meteorological Services at Königstein-Taunus. Between 1951–1954, 642 cases were considered. A real annual rate could not be found; on the contrary, a diurnal rhythm was observed with peaks between 4–10 h and between 18–20 h. No relation was found between frontal movement and diurnal rhythm. Investigations on the correlation with weather types, air masses, weather evolution, fronts and thunderstorms show that lung-embolism was most frequent with SE and NE cyclonic situations, cold continental air masses and frontal passages and that it decreased with maritime polar air masses and thunderstorms. *Subject Headings:* **1. Weather effects on pulmonary embolism 2. Pulmonary embolism.**—*A.V.*

11.7–104 617.7:551.510.42(472)

Iorish, A. L., **Ulichnyĭ glaznoĭ travmatizm kak pokazatel' zagriazneniia atmosfernogo vozdukha.** [Eye traumatism in the street as an index of atmospheric pollution.] *Leningrad. Sanitarno-Gigienicheskiĭ Meditsinskiĭ Institut, Trudy*, 25:91–96, **1956.** 4 tables. **DLC**— A brief article presenting a summary of extensive investigations of eye irritation showing positive correlation to a high degree with atmospheric pollution (aerosol content) in various parts of Leningrad. Traumatism (irritation or damage) of the eyes, reported by 23 polyclinics during Jan.–June 1953, is shown in a table. Of 10,521 cases of eye injury, 20% occurred in January and 11% in June; 18% were reported from Clinic No. 3 located near a large railroad depot and electric station, and only 1% from each of 4 clinics (Nos. 39, 35, 18 and 10) located in residential areas with a large amount of green (vegetative) area in contrast to the clinics reporting large numbers of cases, all of which were in the vicinity of electric plants or industry. Not only the seasonal, but the regional data for various districts show good correlation with aerosol content for that month or area. *Subject Headings:* **1. Atmospheric pollution effects on eyes 2. Eye irritation 3. Industrial pollution 4. Leningrad, U.S.S.R.**—*M.R.*

11.7–105 551.587:551.510.53:612.2(235.25)

Kay, R. H. (*Univ. Lab. of Physiology, Oxford*), **Standard atmospheres in respiratory physiology.** *Nature*, London, 182(4641):1032–1033, Oct. 11, **1958.** fig., 8 refs. **DWB** – A brief note concerning the problem which arose because PUGH'S observations on Everest

pressures (*J. Phys.*, 135:590, **1957**) contradicts the altimeter calibrations of ICAN and implies that ZUNTZ' formula "fits conditions in mountains rather than free air." Mean departures from the International Commission for Air Navigation's "atmosphere" of the actual seasonal mean pressures at three representative latitudes along 80°W are featured in idealized curves. In high-altitude physiology it will pay to measure pressure, and relegate altitude *per se* into its subordinate role. *Subject Headings:* **1. Standard atmosphere 2. High altitude effects on man 3. Respiratory physiology 4. Mount Everest, Himalayas.**—*W.N.*

11.7–106 551.586:599.9:612.8

Müller, Th. (*Austria*), **Vegetative Regulationen bei Klimawechsel aber konstanter Wetterlage.** [Vegetative regulation during a change of climate but with constant weather conditions.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Netherlands, Vol. 2 (Pt. 4), **1958.** 4 p. 3 tables, 3 graphs. **DWB**—The author investigated the reaction of the sympathicus and vagus (measured by the circulation of young individuals after transition to the mountains, during sojourn in the mountains (adaptation) and after return to the initial locality) and the relationship of these results to the results recorded on adults during comparable variable situations. The pulse rate and blood pressure recordings made at intervals on the experimental subjects during the various situations are presented in tables and graphs. On passage to the mountains the autonomic nervous system showed a displacement towards the sympathicus on the second day of sojourn, as is evident from the increased pulse rate; this indicates the exertion of the organism to cope with the new surroundings. This intense stimulus effect is followed by a continuous decrease of the pulse rates in the vagotonic direction, indicating adaptation. The systolic blood pressure showed a steep rise and a slow decline to the normal value. The values of the product of pulse and systolic pressure showed a rapid rise in the sympathiotonic direction and a steep fall during the morning, and a steep rise after the day's activities the rise was lower than expected, the return to normal was not gradual but involved steep ascents and descents in the pulse-systolic product curve. On transition to mountains, adolescents manifested different reactions from those of adults during sojourns and return to the initial surroundings. Adolescents reacted more intensely and less permanently as the climate affects them more than adults. *Subject Headings:* **1. Acclimatization 2. Vegetative nervous system.**—*I.L.D.*

11.7–107 551.584.61:796 551.594.12:551.571:546.264

Vytchikova, M. A., **Ionizatsionnyĭ rezhim vozdukha v sportivnykh zalakh.** [Ionization of air in sports halls.] *Gigiena i Sanitariia*, Moscow, 24(1):82–85, Jan. **1959.** 2 tables, 8 refs. **DLC**—Measurements of ion concentration were made in gymnasia and areas before and after repeated occupancy, which lasted 1½ hours, interrupted by ventilation intervals of 20 min. Ion concentration was measured with a Litvinov counter designed for measuring light ions; simultaneous measurements of temperature, relative humidity and CO_2 were made and also katathermometer readings were taken. The results of the measurements are presented in tables. In the case of gymnasia, the largest decrease in light ions occurred after the first occupancy; further decreases were more gradual. In all cases positive ions predominated. The coefficient of unipolarity varied in an indeterminate manner. The number of light ions was inversely proportionate to relative humidity and CO_2 content; its variation was parallel to that of the dry katathermometer. Similar variation in concentration of light ions was observed in special sports arenas. The concentration of light ions was decreased as the condition of the air deteriorated. *Subject Heading:* **1. Ion concentration measurements.**—*I.L.D.*

11.7–108 551.586:613.11(02)

†Rodenwaldt, Ernst, **Tropenhygiene: Lebenshaltung und Lebensführung in warmen Ländern.** [Tropical hygiene: living standards and conditions in warm countries.] 5th revised and enlarged ed. Stuttgart, Ferdinand Enke, **1957.** 179 p. 18 figs., 57 refs. **DWB** (M86:612 R687tr)—The first edition of this classical text on tropical hygiene was published in 1938 as a result of 16 years of experience in the tropics (Togo and Netherlands Indies). The 4th edition (**1945**) did not have the benefit of much of the recent wartime, postwar and WHO research and experience of the past 12 yrs, so the present (5th) edition has been thoroughly revised. The first 17 pages are concerned with tropical climates in general (illustrated by

climagrams from 10 places in various regions), and the hot moist and hot dry climates in particular. Living conditions in settlements of Europeans and natives, food, water, clothing, hygiene, hygienic education and acclimatization for Europeans and for natives are also considered in separate chapters. Tropical diseases are not emphasized in the text, but the importance of good health, as well as housing conditions, city planning, sanitation, clothing, food, drink, and of humidity, wind (ventilation), shade, temperature, rainfall, etc. is also stressed. *Subject Headings:* **1. Tropical hygiene textbooks 2. Acclimatization in tropics 3. Climagrams.**—*M.R.*

5. INDUSTRY

See also: **Solar houses,** 11.7–288; **Wind power studies, India** (Nilakantan), 11.7–322; **Ventilation for telephone exchanges** (Rossing), 11.7–336; **Runoff and hydroelec. power, Japan** (Arakawa), 11.7–362; **Climat. data for air conditioning** (Kronberg), 11.7–386.

11.7–109 551.556.3:621.311.24

Juul, J., **Wind machines.** *UNESCO, Arid Zone Research,* 7:56–75, **1956.** 26 figs. (incl. photos). French and Spanish summaries p. 73–75. **DWB, DLC**—The use of windmills in Denmark, P. La Cour's experimental mill (Askov, Denmark) which produced electric power, the use of wind power plants in Denmark during World War I and World War II are considered. This is followed by a detailed and technical treatment of the following aspects of the use of wind power: the use of wind power for producing 3-phase A.C. for an existing A.C. network; equations for measuring wind energy; wind tunnel investigations of motor blades; building the experimental hull at Vester Egenborg (Denmark) in order to run a three-phase A.C. generator with a wind mill, the efficiency and energy production of the experimental mill, determination of the effect of wind upon wind motors, construction of power plants, and the economics of wind power plants. *Subject Headings:* **1. Windmills 2. Wind power 3. Denmark.**—*I.L.D.*

11.7–110 551.5:639.2.053.1

Brogmus, Willi (*Hamburg*), **Zur Frage des Zusammenhangs zwischen Fischereiertrag und den meteorologischen Faktoren.** [Relation between fish catch and meteorological factors.] *Annalen der Meteorologie,* Hamburg, 8(9/10):305–313, **1959.** 5 figs., 15 refs. **DWB, DLC**—The author discusses various studies on the relationship between ocean fish catch and atmospheric conditions such as weather defined as "the perceptible stage of the atmosphere at a given instant or the most prominent characteristics during several hours or several days of a successive state" (F. Baur), weather situation and climate. The ecological effect of climatic changes upon fishing is manifested in the distribution of cod in the waters of Greenland where the catch has increased 30-fold on the west coast of Greenland between 1922–1947. Since about 1920 an entire series of new species of Atlantic fish such as sword fish, tuna, mackerel, etc. has migrated northward into Icelandic waters. Weather situations influence the fish catch in that the fish maintains itself in the "mixing" or "transition layer" which is at a moderate depth of 70–90 m with temperatures of 4.5–5°C. When this layer is thin then the yields are low and vice versa. The thickness of this mixing layer depends not only upon the coastal current, the atmospheric temperature and the wind, but also upon the precipitation of the adjacent coastal regions. Graphs showing the direct relationship between precipitation amount and herring yield are presented. Also a relationship between the annual variations of North Sea shell fish and wind conditions during the breeding season is pointed out. The principal direction of distribution of the shell fish is determined essentially by the wind conditions over the North Sea during the breeding period. From February to May, high annual amounts of shell fish were associated with large southerly (S) or easterly (E) and with small northerly (N) or westerly (W) wind components at the particular breeding period while in the case of small amounts of shell fish the reverse holds. Finally, the effect of weather phenomena upon the presence of fish in small areas as expressed by various fishermen's maxims and the effect of weather upon fish catch as indicated by the relationship of storm frequency to catch are discussed. *Subject Heading:* **1. Weather effects on fishing.**—*I.L.D.*

11.7–111 551.5:62 551.5:61

Doing something about weather. *Business Week*, N. Y., No. 1471:92–96, Nov. 9, **1957.** **DWB**—Commercial meteorology not only deserves sincere operation, rewarding returns between the specialists and the customers who buy the weather information but it calls for a strict disciplinary code of ethics as practiced in other professions such as engineering or medicine. This is the essence of this report as viewed by the American Meteorological Society. The report discusses salient facts such as storm warnings, new institutes and the various business organizations that depend on commercial meteorology for their successful operations. *Subject Headings:* **1. Meteorological services 2. Commercial meteorology.**—*N.N.*

6. RADIOACTIVITY

See also: **Radioactive fallout dose patterns** (McCabe), 11.7–309.

11.7–112 539.1.072.3:539.166

Brooke, Cl. (*Centre de Physique Nucléaire de l'Université Libre de Bruxelles*), **Techniques de spectrométrie du rayonnement γ par compteurs à scintillations.** [Techniques of the γ-radiation spectrometry through scintillations recorders.] *Revue M.B.L.E.*, Brussels, 2(1):33–63, Jan. **1959.** 31 figs. 32 refs., eqs. **DLC**—After reviewing the principles of γ-spectrometry by means of scintillation counters, the author describes briefly the devices perfected by the Manufacture Belge de Lampes et de Matériel Electronique. He investigates the conditions of spectra formation and analysis, and discusses those ensuring the best experimental results. He examines the methods of spectra formation and interpretation and also the experimental techniques, with examples of measurements made at the Center for Nuclear Physics of the University of Brussels. *Subject Headings:* **1. γ-radiation spectrometry 2. Scintillation counters.**—*A.V.*

11.7–113 551.510.71:546.295(45)

Cantone, B.; Pappalardo, G. and Ricamo, R. (*all, Cen. Sicil. Fisica Nucleare Ist. Fisica, Univ. Catania*), **Air radioactivity in Catania.** *Nuovo Cimento*, Bologna, Ser. 10, 12(1):84–88, April 1, **1959.** 4 figs., table, 7 refs. **DLC**—Radioactivity from radon and thoron products was measured in dust samples obtained in Catania both out and indoors. The outdoor readings show a high negative correlation with wind speed. Some of the indoor values were twice the permissible amount for Radon 222 and an investigation is being made to identify the materials responsible for this excessive activity. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Radon content of atmosphere 3. Catania, Italy.**—*G.T.*

11.7–114 551.510.72:551.510.42:551.507.352:629.113

Garrigue, Hubert, **Sur la pollution radioactive d'origine artificielle de l'atmosphère et du sol.** [Artificial radioactive pollution in the atmosphere and near the soil surface.] *Académie des Sciences, Paris, Comptes Rendus*, 249(5):737–738, Aug. 3, **1959.** 2 refs. **DWB, DLC**—Atmospheric pollution has been determined at several levels: at upper levels (between 2000 and 6000 m) from an airplane by catching of dust on an adhesive surface, at the observatory on Puy de Dôme (alt. 1465 m), at surface level, and on highways with an especially equipped automobile. At medium altitudes, radioactive pollution remains important. The radioactive impurities contained in the atmosphere are principally brought down to the ground by precipitation. Near the ground accumulation occurs on dust. This may enter houses. On highways, the turbulence caused by car traffic increases the dust and tavellers inhale abundant particles loaded with artificial radioactive products. *Subject Headings:* **1. Atmospheric pollution 2. Radioactive pollution of atmosphere 3. Air-borne radiation measurement 4. Puy de Dôme Observatory, France.**—*A.V.*

11.7–115 551.510.721:551.513(438)

Kopcewicz, Teodor (*Katedra Fizyki Atmos., Univ. Warsaw*), **O problematyce meteorologicznej w związku z rozwojem badań atomowych.** [Meteorological problems connected with the development of nuclear research.] *Acta Geophysica Polonica*, Warsaw, 7(2):217–229, **1959.** 3 figs., 16 refs., 14 eqs. English summary p. 229. **DWB, DLC**—The world-wide progress in nuclear research has given the impetus to one of the most direct methods for

observing the motion of the atmosphere of different scales. Depending on the quantity and the manner of introduction of radioactive substances into the atmosphere and of their disintegration period, one may consider the behavior of the polluted space, its mean motion and size as a function of time, and investigate the concentration of the polluting substances dependent on atmospheric equilibrium, both vertical and horizontal. The size of the polluted space and its height varies depending on the power of the source. Consequently, this method makes possible the study of said phenomena in various scales. In the present paper, the author discusses the question of local or regional radioactive pollution caused by atomic reactors or other fairly high-power open sources, also large scale pollution resulting from experimental nuclear explosions. Formulas are given for air contaminant concentration as a function of time and height in the atmosphere, for the distance of the point of maximum concentration from the source, for maximum concentration value, and for the size of the polluted space resulting from atmospheric turbulence. Finally, the author makes certain proposals regarding meteorological research programs, aiming at continuous observation of the influence of atmospheric conditions on the magnitude of radioactive pollution over Polish territory. *Subject Headings:* **1. Radioactive pollution of atmosphere 2. Radioactive traces in meteorology 3. Radioactivity meteorology 4. Poland.**—*Author's abstract.*

11.7–116 551.510.721:551.577.7

Miyake, Y.; Saruhashi, K. and Katsuragi, Y. (*all, Met. Res. Inst., Tokyo*), **The Sr-90 fallout and the air motion.** *Papers in Meteorology and Geophysics*, Tokyo, 9(3/4):172–176, Jan. **1959.** 4 figs., 9 refs. Japanese summary p. 176. **DWB** –The cumulative amount of Sr 90 in Tokyo through the middle of 1958 reached 11.3 mc/km². The fallout rate of Sr 90 has the positive correlation of +0.69 with the rainfall amount but it has no spring maximum as suggested by MACHTA et al. The estimated amount of fallout in the future will be about 50 mc/km² even if nuclear tests stop now. The average age of fallout which is calculated from the ratio of Sr 89 and Sr 90 was from 200 to 300 days. The difference between atmospheric ozone and the Sr 90 in the stratosphere is discussed. It is concluded that the radioactive deposit on the earth is affected by location and season of introduction of Sr 90 into the stratosphere as well as by the turbulent motion on a larger scale. *Subject Headings:* **1. Strontium 90 stratospheric storage 2. Strontium 90 in rainwater 2. Radioactive fallout patterns 3. Tokyo, Japan.**—*Authors' abstract.*

11.7–117 551.521.2:632.1 551.521.2:616.155.3

Roubault, Marcel; Pascal, Jean and Coppens, René; **Sur une relation possible, directe ou indirecte entre le nombre de cas de leucémie et la radioactivité du sol.** [Concerning a possible direct or indirect connection between the cases of leukemia and ground radioactivity.] *Académie des Sciences, Paris, Comptes Rendus*, 247(3):369–371, July 21, **1958.** fig. **DWB, DLC** For a well-defined region, the leukemia cases of adults was six times more numerous over granitic uranium-formations bearing than over other surfaces. Cases appear principally on the border of mountain masses where radioactivity is generally higher, and one may think of the direct or indirect action of the γ-rays emitted by the natural radioactive bodies. Preventive measures seem to be imperative; the water analysis should involve not only the search for bacteria and for certain chemical compounds, but also the search for radioactive material, and any abnormal radioactivity should be reported to the health authorities. *Subject Headings:* **1. Radioactivity effects on leukemia 2. Leukemia prevention.**—*A. V.*

11.7–118 551.510.72 551.508.25 551.521.6(52)

[Sharpe, Jack and Taylor, Denis], **Mesure et détection des rayonnements nucléaires.** [Measurement and detection of nuclear radiation.] Paris, Dunod, **1958.** 321 p. figs., tables, refs. Author and subject indexes. This is a transl. by J. Chatelet of Sharpe, Jack: **Nuclear radiation detectors.** London, Methuen, **1955.** 179 p. **DLC** (AC787.C6545) and of Taylor, Denis: **Measurement of radio isotopes.** London, Methuen, **1957.** 132 p. illus. **DLC** (QC795.T3 1957)—This is a translation of two monographs—one on the measurement of radio-isotopes, the other on nuclear radiation detectors. The main part of the book gives a full account of the concepts of physics which apply to the functioning of radiation detectors. Among others we find: reaction tables used to detect neutrons, the corresponding effective

sections, the runs of penetration particles in matter. There are two other sections in this theoretical study. One devoted to measurement methods, containing everything the user must be acquainted with to make accurate measurements: primers of radioactivity and statistics, the use of numbering methods, with precautions against blindage, geometrical dispositions and correction calculations. The other deals with the functioning of detectors: ionization chambers, Geiger and proportional counters, scintillation counters and accessory equipment. Numerous tables give the characteristics of the materials used and the bibliographical references, mentioned at the end of each chapter, make it possible for the reader to locate the technical and electronic characteristics of the apparatus described. A chapter on sanitary precautions completes the book. This work constitutes a very useful guide for the technician, as well as the engineer, the experimenter, biologist, physician, chemist or physicist. *Subject Headings:* **1. Nuclear radiation measurement techniques 2. Nuclear radiation detection instruments 3. Radio-isotope measurement techniques 4. Geiger counter. I. Chatelet, J.** *(transl.).—A.V.*

C. ASTRONOMY AND ASTROPHYSICS

1. ASTROPHYSICS

See also: **Heaven and earth,** 11.7–1

11.7–119 523.743:778.34:551.510.53

†Schwarzschild, Martin (*Princeton Univ. Obs.*), **Photographs of the solar granulation taken from the stratosphere.** *Astrophysical Journal*, Chicago, 130(2):345–363, Sept. **1959.** 5 figs., 2 tables, 25 refs., 13 eqs. **DWB, DLC**—A 12-in. solar telescope equipped with a photoelectric pointing mechanism and an automatic camera has been flown by unmanned balloons to an altitude of 80,000 ft. A number of photographs of the solar granulation obtained with this telescope are of very high definition and show the granulation to have the character of non-stationary convection. The bright granules, ranging in diameter from about 300 to about 1800 km, are of highly irregular, often polygonal, shape and are separated from one another by dark, often very narrow, lanes. The root-mean-square temperature fluctuation, uncorrected for instrumental smoothing, is found to be only ±60°. The analysis suggests that the true root-mean-square temperature fluctuation is probably not larger than ±100°. *Subject Headings:* **1. Solar granulation photographs 2. Stratospheric observation of solar granulation.** *—Author's abstract.* Ⓢ

11.7–120 523.36

Kopal, Zdenek (*Head, Dept. of Astron., U. of Manchester*), **Does the moon possess a magnetic field?** *Space Journal*, Nashville, Tenn., 2(1):3–8, Sept. **1959.** 6 figs.—Direct information on lunar magnetism is still lacking. However, several recent astronomical investigations carried out in terrestrial observatories have thrown considerable light on the question of a possible lunar magnetic field, and in fact, may have gone a long way toward answering it—in the negative. The method employed was based on studies of lunar luminescence. The present article first explains lunar luminescence, and then presents several arguments based on it which negate the possibility of a magnetic field on the moon. Several photographs nicely illustrate various probes and the lunar surface. *Subject Headings:* **1. Moon 2. Lunar luminescence 3. Magnetic field of moon.**—*I.S.* Ⓢ

11.7–121 523.42:535.33

Heyden, F. J.; Kiess, C. C. and Kiess, Harriet K. (*all, Georgetown Coll. Obs. Wash., D. C.*), **Spectrum of Venus in the violet and near-ultraviolet.** *Science*, Wash., D. C., 130(3383):1195, Oct. 30, **1959.** figs., 7 refs. **DLC**—Recent observations of the spectrum of the planet Venus, with spectrographs of low and high dispersion at the Georgetown College Observatory, show that a wide, continuous absorption band is present in the violet and near-ultraviolet. The band begins near wavelength 4500 Å and extends to the short wavelength limit of our spectrograms near 3800 Å. It is similar in structure to the strong absorption, reported by others, for gaseous nitrogen tetroxide. *Subject Headings:* **1. Venus 2. Absorption bands.**—*Authors' abstract.* Ⓢ

11.7–122 523.43

Barabashov, N. P., **Novoe v izuchenii Marsa.** [Recent studies of Mars.] *Priroda*, Moscow, No. 6:13–18, June **1959.** 6 figs. **DWB, DLC**—The author gives a detailed account of the results of recent astronomic studies of Mars during the last great opposition of the planet in 1956 as obtained by the Soviet observatories of Kharkov, Tashkent, Abastumani, Crimea and Kazakh, by means of photographic, spectroscopic, astrographic and telescopic observations. It has been found that appreciable changes take place sometimes both in the atmosphere and on the surface of the planet. *Subject Heading:* **1. Mars.**—*A.M.P.* ⑤

2. SOLAR PHYSICS

See also: **Solar-mag. relationships** (Egedal), 11.7–154; **Solar-geomag. relationships** (Hansen), 11.7–158; **Solar-geomag. relationships** (Hansen et al.), 11.7–159; **Solar-mag. relationships** (Sinno), 11.7–160; **Sunspot-mag. storm relationships** (Chivers), 11.7–164.

11.7–123 523.746

Bell, Barbara (*Harvard College Obs.*), **On the magnetic field strengths of sunspots.** *Astronomical Society of the Pacific, Publications*, 71(419):165–167, April **1959.** table, 3 refs. **DLC.** Reprinted as Harvard Univ. Observatory. Solar Dept., Contract AF 19(604)-4692, Scientific Report, No. 4, Oct. **1959. DWB** (M(051) H339sci)—A brief over-all survey of the remarkable sunspots during the years 1917 through 1958 is given. The current sunspot maximum has the highest sunspot numbers ever recorded. Exceptional activity in the higher altitudes, the tremendously large sunspot groups of 1947 and the complex Zurich spot types of 1947 and 1957 have all been reported. Mount Wilson also shows that 14.3% of all spot groups in 1957, and 14.5% in the 6 months of 1958, fell in the limb-to-limb class. This class contained 16.5% of the spots in the 1944–1954 cycle and 17.4% in 1937–1944. For 1946–50 only, the percentage was 18.5. It is accepted that 1957 had a subnormal frequency of long lived sunspots. All the data during the years are shown in tabular form. *Subject Heading:* **1. Sunspot data analysis.**—*N.N.* ⑤

11.7–124 523.755:523.745

Bachmann, H. (*Zurich*), **Zur Deutung der Polarstrahlen der Korona als magnetische Kraftlinien.** [Interpreting the polar rays of the corona as magnetic power lines.] *Zeitschrift für Astrophysik*, Berlin, 44:56–63, **1957.** 4 figs., 4 tables, 7 refs., eqs. **DLC.** Reprint issued as *Zürich. Eidgenössische Technische Hochschule, Sternwarte, Astronomische Mitteilungen*, No. 211, **1957. DLC**—The undisturbed minimum corona, observed during the solar eclipse of June 30, 1954, was symmetrical to the solar axis and to the equatorial plane and showed both equatorial rays whose bases included the heliographic latitudes up to about 60–65°. These polar rays, as well as the large equatorial rays, were earlier interpreted as path curves of particles, which emerge from the sun or arise from space and which are subject to the magnetic field, that is set approximately equal to the field of a dipole in the center of the sun and which are subject to the gravitation field of the sun. It is shown that these polar rays of the minimum corona can be interpreted as field lines of a bar magnet whose pole lies upon the solar axis at intervals of about 0.6 solar radii from the solar center or also as field lines of two current circles in the solar interior of not exactly determinable magnitude which lie in planes with distances of about 0.5 solar radii from the equatorial plane; while no such explanation is possible for the large equatorial rays. *Subject Headings:* **1. Solar coronas 2. Solar eclipse, June 1954.**—*I.L.D.*

11.7–125 523.755

Kononovich, E. V., **Solnechnaia korona.** [Solar corona.] Moscow, Gosud. Izd. Fiziko-Matematicheskoĭ Literatury, **1958.** 86 p. 30 figs. (*Populiarnye Lektsii Po Astronomii*, No. 9.)—A comprehensive booklet giving a detailed description and explanation of all facts known about the sun's corona. The 14 chapters of the pamphlet deal consecutively with: 1) Methods of studying heavenly bodies; 2) The sun and its atmosphere; 3) The external aspect of the corona; 4) The spectrum and polarization of light in the corona; 5) Corona observations without solar eclipse; 6) Enigmas of the corona; 7) Identification of coronal lines; 8) The

corona's temperature; 9) The sun's corona and radio emission; 10) The physical nature of the corona; 11) The false corona and zodiacal light; 12) The corona's place in the sun's atmosphere; 13) The solar corona and the earth's atmosphere and 14) The origin of sun's corona. *Subject Heading:* **1. Solar coronas.**—*A.M.P.*

11.7–126 523.755:523.036.515

Schwartz, Sanford B. (*Martin Co., Denver*) and Zirin, Harold (*High Alt. Obs., Univ. of Colo.*), **Collisional ionization cross-section for Fe XIV in the solar corona and the coronal electron temperature.** *Astrophysical Journal*, Chicago, 130(2):384–392, Sept. **1959.** 2 figs., 4 tables, 18 refs., 29 eqs. **DWB, DLC**—A new calculation of the ionization cross section of Fe XIV by electron collision is given, using a hydrogen-like model where all continuum wave functions approach coulomb functions at large distances from the atom. The resulting cross section is more than a factor of 10 smaller than the values in current use and, when inserted in the coronal ionization formula, gives an electron kinetic temperature of about 2×10^6 degrees for a green to-red line-intensity ratio of unity. *Subject Headings:* **1. Solar coronas 2. Coronal electron temperature.**—*Authors' abstract.* Ⓢ

3. ECLIPSES

11.7–127 522.15(485):523.78

*Svensson, S. I.; Hellgren, G. and Perers, O., **The Swedish Radioscientific Solar Eclipse Expedition to Italy, 1952: preliminary report.** *Goteborg, Sweden. Chalmers Tekniska Hogskola, Handlingar*, No. 181, (its subseries *Electrical Engineering Series*, Vol. 7, No. 6), **1956.** 30 p. 20 figs., 15 refs., eq. **DWB, DLC.** Also issued as: *Acta Polytechnica*, Stockholm, No. 212, **1957.**—Pt. I of the report accounts for the ionospheric part of the expedition. It gives general information of the sweep-recording equipment. Further it presents the E, F1 and F2 observations made. The experimental reduction in critical frequency is found to be greater than theoretically predicted. The discrepancy is discussed. Pt. II accounts for the solar noise measurements on 2 m wave length. General information about equipment and antenna system is given. Total intensity and the amount of circular polarization of the solar radiation were measured. A short discussion of the observational results is given. *Subject Headings:* **1. Swedish Radioscientific Solar Eclipse Expedition to Italy, 1952 2. Eclipses 3. Astronomical instruments 4. Italy.**—*Authors' abstract.*

11.7–128 91.04(43) 523.78

Totale Sonnenfinsternis im Oktober. [Total solar eclipse in October.] *Naturwissenschaftliche Rundschau*, Stuttgart, 12(9):347, Sept. **1959. DWB, DLC**—A total solar eclipse occurred on Oct. 1, 1959. It was visible from the west coast of the U. S. across the Atlantic, the Canaries, Spanish and Portuguese West Africa up to Abyssinia, Somaliland and a part of the Indian Ocean. The greatest duration of totality reached 3 min. 2 sec. at 13:30 Central European time at 20°N and 1°W; the partial phase extended over all of Europe. The German expedition was directed by F. Schmeidler (University Observatory of Munich). Its principal task was to obtain astronomical precision photographs for relativity light deviations at the edge of the sun. A point 400 km northeast of Timbuktu was selected as the location of the expedition. *Subject Heading:* **1. Solar eclipse, Oct. 1959.**—*I.L.D.* Ⓢ

4. METEORS

See also: **Magnetic effects from meteors** (Hawkins), 11.7–161; **Turbulence effects on meteors** (Greenhow, Neufeld), 11.7–304.

11.7–129 523.5:551.501.81:551.557

Groves, G. V. (*Dept. of Physics, Univ. College, London*), **A theory for determining upper-atmosphere winds from radio observations on meteor trails.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 16(3/4):344–356, Nov. **1959.** 2 figs., 2 refs., 35 eqs. **DWB, DLC**—Least-squares theory is applied to observations on drifting meteor trails to obtain the determination of a general number of parameters, characterizing the wind structure. The

results enable vertical air motion and time- and height-variations in the wind structure to be examined, whereas previously a constant horizontal wind was assumed. It is shown how, on the basis of the least-squares solution, the errors in the parameters, and hence in the calculated wind structure, can be estimated. The method is applied to a typical set of data. *Subject Headings:* **1. Meteor trail wind observations 2. Upper air wind measurement techniques.**—*Author's abstract.* Ⓢ

11.7–130 523.5

Kornilov, N. A., **Krupnyĭ meteor nad Kol'skim poluostrovom.** [A large meteor over the Kola Peninsula.] *Priroda*, Moscow, No. 6:113, June **1959. DWB, DLC**—The passage of a large meteor over the northern part of Kola Peninsula was observed from the city of Kirovsk at 8:15 p.m. on Nov. 21, 1957 in the interval of azimuths 350–30° at an angle of 35–50° to the horizon. The direction and trajectory of its movement and the consecutive phases of its appearance as well as its fiery tail are briefly described in a report of the Kola branch office of the U.S.S.R. Academy of Sciences. *Subject Headings:* **1. Meteors 2. Kola Peninsula, U.S.S.R.**—*A.M.P.* Ⓢ

11.7–131 523.5:551.501.81

McNamara, A. G. and McKinley, D. W. R. (*Natl. Res. Council, Ottawa*), **The effect of trail irregularities on the interpretation of meteor echoes.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 16(1/2):156–159, Oct. **1959.** 6 ref., eq. **DWB, DLC**—A brief discussion of some points raised in a recent paper by MANNING on obliquely-scattered meteor echoes, is followed by the suggestion that the initial distribution of ionization along a typical meteor trail is markedly irregular. Several tentative hypotheses are advanced to account for the irregularities. *Subject Headings:* **1. Meteor echoes 2. Meteor ionization trails.**—*Authors' abstract.* Ⓢ

11.7–132 523.5:551.501.81

Meeks, M. L. and James, J. C. (*both, Georgia Inst. of Technology*), **Meteor radiant distributions and the radio-echo rates observed by forward scatter.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 16(3/4):228 235, Nov. **1959.** 4 figs., table, 10 refs. **DWB, DLC** The diurnal variations in sporadic meteor echo rate observed by the forward scattering of radio waves over three different paths are compared with predictions based on a simplified model of the average radiant distribution which has been obtained from radar data by HAWKINS. Our simplified distribution is composed of three hypothetical meteor showers with radiants at the apex of the earth's way and at points in the ecliptic at angles ±65° from the apex. Reasonably good agreement is found between these predictions and extensive measurements reported by VOGAN and CAMPBELL. Additional measurements reported here for two paths—Boston, Mass. to Atlanta, Ga. (1480 km) and Boston, Mass. to Columbia, S. C. (1250 km) also show similar agreement. Evidence of the concentrations of radiants near the sun and antihelion points appear in the average diurnal rate for periods of about 1 month. In general forward-scatter measurements appear consistent with HAWKINS' radiant distribution. *Subject Headings:* **1. Meteor echo measurement techniques 2. Sporadic meteor echoes.**—*Authors' abstract.* Ⓢ

D. OUTER ATMOSPHERE

1. COSMIC RADIATION

See also: **Auroral-cosmic ray relationships** (Winckler et al.), 11.7–146; **Cosmic ray ionization** (Large, Wormell), 11.7–394.

11.7–133 551.521 64:551.590.22

Bagge, E. and Binder, O., **Eine lunare Intensitätschwankung der kosmischen Strahlung und ihr Ursprung** [A lunar effect in the intensity variation of cosmic rays and its origin.] *Die Naturwissenschaften*, Berlin, 46(13):424, July 15, **1959 DLC**—From the analysis of

observations of the meson intensity made according to the IGY program, it can be attributed to a lunar effect, the amplitude of which represents 1.2‰ of the total intensity, the minimum being observed 3 or 5 hrs after culmination and the maximum, 17 or 20 hrs after culmination. Geometrical conditions do not explain this effect and it is necessary to consider the magnetic field of the moon. *Subject Headings:* **1. Cosmic ray intensities 2 Lunar effects 3 Magnetic field of the moon.**—*A. V.* Ⓢ

11.7–134 551.521.64 523.165

Parker, E. N. (*Inst. Nuclear Studies, Univ. Chicago*), **On the variations of the primary cosmic ray intensity.** (In: Lehnert, Bo Peter (*ed.*), **Electromagnetic phenomena in cosmical physics.** Cambridge Univ. Press, **1958.** p. 420–427. 12 refs., eq.) **DLC** (QB461.L43)—To construct a model for producing the observed variation in the cosmic ray intensity we consider primarily the Forbush decrease and the general decrease of the cosmic ray intensity during years of solar activity. These are larger variations than the diurnal and 27-day variations and require more drastic assumptions; thus they will better serve to establish a unique model. It is assumed that the sun does not emit cosmic ray particles except during the time of a solar flare. Thus, decreases in the cosmic ray intensity are to be interpreted as a solar effect which inhibits the arrival of galactic cosmic ray particles at earth. Since the intensity of low rigidity primary cosmic ray particles is observed to vary more than the intensity at higher rigidities, the inhibition has generally been assumed to be caused by magnetic fields. The necessary depression of the cosmic ray intensity requires both a barrier, to impede their arrival, and a removal mechanism within the barrier, to prevent eventual statistical equilibrium (with uniform particle density). Quantitative development indicates that a heliocentric magnetic dipole, a heliocentric cavity in the galactic field (Davis, *Phys. Rev.*, 100:1440, **1955**), and a heliocentric interplanetary cloud barrier (Morrison, *Phys. Rev.*, 101:1397, **1956**), all encounter serious difficulties in explaining the observed effects, one reason being the ineffective removal that is available. It is shown that a geocentric magnetic cloud barrier does not encounter these difficulties: it is proposed that during the years of solar activity the terrestrial gravitational field captures magnetic gas of solar origin from interplanetary space, which is then supported by the geomagnetic field; the removal by absorption by the earth is sufficiently effective that only a relatively thin barrier need be maintained; the occasional capture of new magnetic material accounts for the abrupt onset of the Forbush decreases, and the slow decay (0.5 year) of the captured fields for the smooth variation of the mean cosmic ray intensity with the sunspot cycle. *Subject Headings:* **1. Cosmic ray intensities 2. Primary cosmic rays.** —*Author's abstract.*

11.7–135 551.521.64

Zatsepin, G. T.; Nikol'skiĭ, S. I. and Pomanskiĭ, A. A., **Raspadnye protsessy pri razvitii kaskadernykh kaskadov v atmosfere.** [Decay processes in the development of nuclear cascades in the atmosphere.] *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, Moscow, 37(1):197–201, July **1959.** 6 refs., 16 eqs. Russian summary p. 197; English summary p. 201. **DWB.** English transl. available in *Soviet Physics, JETP*, N. Y.—A general method is presented for the solution of the equations describing the nuclear-cascade process in the atmosphere for initial conditions prescribed at an arbitrary depth. The fraction of energy expended by nuclear-cascade showers as a result of $\pi \rightarrow \mu + \nu$ decay is estimated. *Subject Heading:* **1. Cosmic ray showers.**—*Authors' abstract.* Ⓢ

11.7–136 538.69:551.521.64

Swann, W. F. G. (*Franklin Inst., Swarthmore, Pa.*), **Electromagnetic acceleration of particles to cosmic ray energies.** (In: Lehnert, Bo Peter (*ed.*), **Electromagnetic phenomena in cosmical physics.** Cambridge Univ. Press, **1958.** p. 428–440. 2 figs., 3 refs., 19 eqs.) **DLC** (QB461.L43)—It has been demonstrated that if a particle is accelerated in an electromagnetic field between two points designated by subscripts (1) and (2), the particle will gain energy in passing from (1) to (2) provided that the quantity J defined by

$$J = s\frac{\partial}{\partial s}(U_{s2} = U_{s1})^2 - 2\frac{\partial U_s}{\partial t}\int S\frac{\partial U_s}{\partial s}dt$$

is positive, where ds is an element of path, U_{s^1} and U_{s^2} are the initial and final values of the vector potential along the path, and t is the time. Moreover, if the particle is at rest at the point (1), its energy W at the point (2) is such that

$$W_2 > e\left|\left(U_{s^2} - U_{s^1}\right)\right|.$$

here e is the charge on the particle. A study has been made of the problem in which the motivating agency responsible for the electromagnetic field is a toroid with currents circulating in such fashion as they would circulate if the anchor ring of the toroid were wound with a wire in which a current decayed with time. The particular case studied is that where a particle moves along the axes of symmetry, and dimensions are chosen of astronomical size such as to make them apply to such phenomena as are observed in certain nebulae. The magnitudes chosen are as follows: $a \equiv$ Radius of cross section of the toroidal winding $= 1$ light year. $r_0 \equiv$ Mean radius of toroid $= 2000$ light years $H_0 \equiv$ Initial field in the toroid $= 10^{-3}$ gauss. $v/\alpha \equiv$ Time for the current to decay to $1/e$ of its initial value $= 1000$ years. With the above assumptions, a particle of electronic charge, starting from the center of the toroid and travelling along the axes of symmetry would acquire an energy in excess of 3×10^{14} eV. *Subject Heading:* **1. Electromagnetic effects on cosmic rays.**—*Author's abstract.*

11.7–137 551.508.9:551.521.64

Conversi, M.; De'Munari, G. M. et al., **Dispositivo atto a selezionare nella radiazione cosmica eventuali particelle di massa intorno a 500 m_e.** [Apparatus for possible identification of particles with a mass of 550 m_e in cosmic radiation.] *Nuovo Cimento*, Bologna, Ser. 10, 12(2):130–137, April 16, **1959.** 5 figs., 2 tables, 3 refs. English summary p. 130; Italian summary p. 137. **DLC** The apparatus employed in a search for the 550-mass particles reported by ALIHANIAN et al. is described. Unwanted particles are eliminated electronically by a suitable arrangement of scintillation Cerenkov, and GM counters. The recorded particles are observed in a large dual Wilson chamber. The mass is essentially deduced by the combined measurements of range in this chamber and dE/dx in a proportional liquid scintillator. It is shown that the background of spurious 550-mass particles is entirely negligible and that genuine 550-mass particles could not be missed. *Subject Headings:* **1. Cosmic ray particles 2. Cosmic ray instruments 3. Wilson chamber. I. Egidi, A. II. Fiorini, E. III. Ratti, S. IV. Rubbia, C. V. V. Succi, C. VI. Torelli, G.**—*Authors' abstract.* Ⓢ

11 7–138 551 593.12:551 508.91

Hoppe, Walter (*Physikalisches Inst. der Univ. Heidelberg*), **On the scintillation effect in photo-electric nucleus counters.** *Geofisica Pura e Applicata*, Milan, 43:255–258, May/Aug. **1959.** 2 figs., 2 refs., 7 eqs. German and English summaries p. 255. **DWB, DLC**—The "scintillation effect" occurring in photoelectric nucleus counters is explained as follows: after an adiabatic expansion a radial temperature distribution is formed in the fog-tube to which corresponds an opposite radial distribution of the refraction index of air. This causes a deflection of the light beam in the direction of the larger optical density, giving as a result the changes of the photo-current. A calculation following this idea yields the right order of magnitude and the time dependence of the effect. *Subject Headings:* **1. Photoelectric nuclei counters 2. Scintillation effects.**—*Author's abstract.* Ⓢ

2. IONOSPHERE

See also: **IGY ionos. program** (Mitra), 11.7–25; **Ionos. radio wave propagation** (Keary), 11.7–37; **Outer atmos. symposia** (Ratcliffe et al.), 11.7–41; **Standard atmos. and respiratory physiology** (Kay), 11.7–105; **Stratospheric obs. of solar granulation** (Schwarzschild), 11.7–119; **Radio star absorption and scintillation** (Chivers, Greenhow), 11.7–163; **Ionos. effects on radio stars** (Ko), 11.7–166; **Satellite re-entry** (Garber), 11.7–172; **Ion density in stratosphere** (Kroening), 11.7–249.

11.7–139 551.510.535:061.3

International Council of Scientific Unions. Mixed Commission on the Ionosphere, N. Y. Univ., Aug. 14–16, 1957, **Proceedings of the Fifth Meeting.** Ed. by W. J. G. Beynon. *Journal*

of Atmospheric and Terrestrial Physics, London, 15(1/2):1–176, Sept. **1959.** Entire issue devoted to proceedings and the papers of this meeting. (For listing of contents, *see* Pt. III, p. 1779, Nov. 1959, *Met. Abstracts.* All papers abstracted separately.) **DLC**—The Proceedings include 11 papers read and the resolutions drafted at the Fifth Meeting of the Mixed Commission on the Ionosphere as well as 26 papers submitted to the Commission. Members of the Commission and delegates at the meeting are listed. *Subject Headings:* **1. Ionospheric conferences. I. Beynon, W. J. G.** (*ed.*).—*M.L.R.* Ⓢ

11.7–140 550.388.2:523.74:551.510.535

Rastogi, R. G. (*Phys. Res. Lab., Ahmedabad* 9, *India*), **Geomagnetic influence on the F1- and F2-regions of the ionosphere-effect of solar activity.** *Journal of Atmospheric and Terrestrial Physics*, London, 14(1/2):31–40, April **1959.** 5 figs., table, 8 refs. **DLC**—The paper discusses the geomagnetic influence on the noon critical frequencies of F1 and F2 layers in different seasons and at different stages of solar activity. The F1 layer is found to be affected by the magnetic field only in years of high solar activity. The equatorial depression of noon foF2 is, on the other hand, most prominent in years of low solar activity. *Subject Headings:* **1. Geomagnetic effects on ionosphere 2. F layers 3. Solar activity 4. F2 layer critical frequencies 5. F1 layer critical frequencies.**—*Author's abstract.* Ⓢ

3. AURORAS

See also: **Hist. of auroras** (Morlet), 11.7-57; **Auroral ionization** (Chivers, Greenhow), 11.7–163.

11.7–141 551.594.51:535.33

*†Clark, K. C. (*Univ. Wash., Seattle*) and Belon, A. E. (*Geophysical Inst., Univ. of Alaska*), **Spectroscopic observations of the great aurora of Feb. 10, 1958, Pt. 1, Abnormal vibration of N_2^+.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 16(3/4):205–219, Nov. **1959.** 7 figs., 4 tables, 48 refs., 4 eqs. **Pt. 2, Unusual atomic features.** *Ibid.*, p. 220–227. fig., 2 tables, 12 refs. **DWB, DLC**—In Pt. 1, auroral spectrograms taken with the IGY patrol spectrograph at College, Alaska, during the great aurora of 10–11 Feb. 1958, show high vibrational excitation in the $B(^2\Sigma\nu^+)$ state of N_2^+, as indicated by the enhanced intensities of the 4652 Å (1,3) and 4600 Å (2,4) bands relative to the 4709 Å (0,2) band of the first negative system. The grating spectrograms presented consist of 18 successive exposures throughout the night from 0308 to 1529 hrs UT 11 Feb. and resolve the magnetic meridian from North to South along the length of the slit image. Intensity ratios are compared with those of synthetic spectra at the same 8 Å resolution calculated assuming Boltzmann distributions at various excitation temperatures of vibration and of rotation. The excitation can in this manner be roughly characterized by $T(\text{vib}) = 4000°\text{K}$ and $T(\text{rot}) = 2500°\text{K}$. The enhancement is frequently so strong as to reverse the normally decreasing order of intensities of the (0,2) and (1,3) bands. Unusually intense emission from hydrogen is frequently present, and the measured Doppler shifts of H_α indicate velocities up to at least 800 km/sec. These auroral measurements lend observational support to the concept that charge exchange becomes a major process in great auroras. In Pt. 2, auroral spectrograms taken with the IGY patrol spectrograph at College, Alaska, during the great red aurora of 10–11 Feb. 1958, show a large number of seldom seen atomic lines. Most of these enhanced emissions are identified as transitions of *OI* and *NII*. In particular, the identification of both low level forbidden lines of *NII* at 5755 Å and 6584 Å definitely establishes their presence in the auroral spectrum. Relative intensities of the auroral atomic emissions in three representative spectra are given and are compared with their intensities in a normal intense aurora. The unusual intensities and spatial behavior of some emissions are discussed in terms of their excitation mechanisms. *Subject Headings:* **1. Auroral spectrograms 2. Auroral emissions 3. Auroral energy excitation mechanisms 4. College, Alaska.**—*Authors' abstract.* Ⓢ

11.7–142 551.594.5(99)

Hale, D. Payne (*USNC-ICY Deepfreeze Two Expedition to Antarctica*), **Characteristics of the visual aurorae at Byrd Station, Antarctica during 1957.** *Journal of Atmospheric and*

Terrestrial Physics, N. Y., 17(1/2):65–70, Dec. **1959.** fig. **DWB, DLC**—Characteristics of the visual auroras observed at Byrd Station, Antarctica, located at 80°S lat., 120°W long., during the last half of 1957 are discussed. Salient features of auroral activity variations in time, spatial and motion patterns, colour frequency, vortices, swirling rays, special forms and other aspects are delineated. The most active period over the season during the Greenwich sidereal day is from 0200 to 0600 G.C.T. Auroras of asymmetric intensity relative to the geomagnetic meridian were observed, with the brightest portion about three times more likely to occur east rather than west of the meridian. Off-meridian auroras and bands of long duration were observed. The direction of motion of features was overwhelmingly from west to east; and forms were much more likely to drift northward than southward. A possible method for measuring ray-lengths employing but a single point of observation is sketched. *Subject Headings:* **1. Auroras 2. Auroral rays 3. Byrd Station, Antarctica.** —*Author's abstract.* Ⓢ

11.7–143 551.594.51(99)

Malville, J. M. (*Yerkes Obs., Univ. of Chicago*), **Type-B aurora in the Antarctic.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 16(1/2):59–66, Oct. **1959.** 3 figs., table, 19 refs., 12 eqs. **DWB, DLC** –Spectrograms obtained in the Antarctic during 1957 of auroras with red lower borders are described. The outstanding feature of this type of aurora is an enhancement of the first positive system of N_2. A reaction of mutual neutralization of the N_2^+ molecule by the O_2^- negative ion is proposed to account for the observed enhancement. Assuming optimum values for rate coefficients and an altitude of 70 km, mutual neutralization will proceed with a time constant of the order of 1 sec, consistent with the observed short life time of type *B* aurora. The observed enhancements of the first negative system of O_2^+ and of sodium "*D*" are also postulated as resulting from the penetration of an energetic beam of electrons to the 70–90 km level of the *D* region. A monoenergetic beam of electrons and protons of 240 keV is compatible with the elevations of homogeneous arcs and type *B* aurora. Other possible excitation mechanisms for type *B* are discussed. *Subject Headings:* **1. Auroral spectrograms 2. Auroral energy excitation mechanisms 3. Antarctica.**—*Author's abstract.* Ⓢ

11.7–144 551.594.5:551.501.81

Schlobohm, J. C.; Leadabrand, R. L. and Dyce, R. B. et al. (*all, Stanford Res. Inst., Menlo Park, Calif.*), **High-altitude 106.1-Mc radio echoes from auroral ionization detected at a geomagnetic latitude of 43°.** *Journal of Geophysical Research*, Wash., D. C., 64(9):1191–1196, Sept. **1959.** 11 figs., table, 10 refs. **DLC**—Auroral echoes have been detected using a radar at 106.1 Mc located at 43° geomag. latitude. The geometry of reflection for ionization aligned with the earth's magnetic field lines is such that, for a geomagnetic latitude of 43°, reflection can occur as high as 300 km. The results of these observations are presented, with an interpretation of the height of reflections and a discussion of the advisability of making low-latitude auroral echo investigations. *Subject Headings:* **1. Radio echoes from auroras 2. Radar observation of auroras. I. Dolphin, L. T. II. Berg, M. R.**—*Authors' abstract.* Ⓢ

11.7–145 551.594.5

Sluchaĭ redkogo poliarnogo siianiia. [A rare aurora.] *Priroda*, Moscow, No. 2:87–89, Feb. **1959. DLC**—The auroras observed on the nights of July 8 and 9 and Sept. 5, 1958 are described on the basis of reports sent in by various observers in the U.S.S.R. In the case of both auroras, the sun displayed considerable sunspot activity; intense solar flares, strong magnetic storms and reduction of critical frequencies in the F layer of the ionosphere were observed. *Subject Headings:* **1. Auroras 2. U.S.S.R.**—*I.L.D.* Ⓢ

11.7–146 551.594.5:551.521.64

Winckler, J. R.; Peterson, L. et al., **Auroral X-rays and related phenomena during the storm of Feb. 10–11, 1958.** *Journal of Geophysical Research*, Wash., D. C., 64(6):597–610, June **1959.** 9 figs., 5 tables, 12 refs. **DWB, DLC.** Also issued as: Minnesota Univ. School of Physics, Technical Report on 2.12 Cosmic Ray Intensity at High Altitude by the U. S. National Committee for the IGY, in cooperation with Office of Naval Research, Wash., D. C., National Science Foundation, Nov. **1958.** 34 p. illus., tables. (Original unchecked.) (ASTIA AD-208-422)—Balloon observations were made during the auroral storm of Feb. 10–11, 1958 at Minneapolis. Strong x-ray bursts in 2 groups were detected. The groups

ppeared coincident with 2 large magnetic bays, with strong radio noise absorption, and with e passage across the zenith of a very large array of auroral luminosity. From the x-ray tensity and measured energies an electron current of 0.6×10^6 electrons/sq cm/sec is present. nese electrons ionizing the upper D layer account for the increased cosmic noise absorption. ne x-rays themselves are 1000 times less intense and do not provide sufficient ionization. sual auroral forms during this storm are reported to have lower borders at the 200- to 300-km vel. There is a difficulty in bringing the electrons to the D layer without an accompanying sible aurora. A cosmic ray decrease accompanied the storm and was observed to be from to 6% at sea level, 21% in the balloon altitude ionization, and 15% in total energy influx 55° geomag. latitude. Compared to the great intensity of the magnetic and auroral phe- mena in this storm, the cosmic ray modulation is not exceptionally large. *Subject Headings:* **Auroral radiation 2. Auroras 3. Cosmic rays 4. Minneapolis, Minn.** *-TAB abstract.*

11.7–147 551.594.51:546.21

Halliday, Ian (*Dominion Obs., Ottawa*), **Auroral green line in meteor wakes.** *Astro- ysical Journal*, Chicago, 131(1):25–33, Jan. **1950.** 2 figs., table, 13 refs. **DWB, DLC**— ne auroral green line (λ5577) has been found in 12 meteor spectra photographed from 1955 to 58. It is normally confined to the top portion of the photographed trail with an extreme ight range of from 120 to 79 km. At times of increased solar activity the line appears to rsist to lower heights. Only fast meteors have been observed to produce the line. The citation mechanism is obscure but probably involves ionization of either atmospheric or eteoric origin. The lack of any perceptible decay in the breaks when spectra are photo- aphed through a rotating shutter indicates that de-exciting collisions are less frequent than sec. There is no evidence to support the presence of λ5577 in long-enduring meteor trains. *ubject Headings:* **1. Auroral green line 2. Meteor spectra 3. Meteor ionization trails.**— *uthor's abstract.* Ⓢ

11.7–148 551.594.51:535.24

†Rees, M. H. (*Nat'l Bur. of Stan., Boulder*), **Absolute photometry of the aurora, Pt. 1. The nized molecular nitrogen emission and the oxygen green line in the dark atmosphere.** *ournal of Atmospheric and Terrestrial Physics*, 14(3/4):325–337, June **1959.** 8 figs., table, refs., 9 eqs. **Pt. 2, Molecular nitrogen emission in the sunlit atmosphere.** p. 338–344. figs., table, 6 refs., 4 eqs. **DWB, DLC**—A low latitude aurora was measured photometrically. nree prominent emission features, λ3914 band of I.N.G. N_2^+, λ5577 of $0I$ and λ6300–6364 $0I$, were isolated with narrow pass band filters and recorded continuously throughout the ght in the meridian sweep. Absolute calibration was carried out, and corrections for the attered light and atmospheric extinction were made. The absolute emission intensity for 914 and λ5577 is given at a selected zenith distance. The ratio of instantaneous intensities (0)5577 to $I(0)3914$ was found to be essentially constant over an intensity range of three owers of ten and to be independent of the type of auroral form. The intensities and correla- ons obtained are consistent with the following excitation mechanisms. In the dark atmos- here the N_2^+ is excited from ionizing collisions of incoming particles with atmospheric N_2. is concluded that the $0I$ λ5577 line results from secondary electrons, arising from the primary nization process above, colliding inelastically with oxygen atoms. The absolute emission tensity of a sunlit aurora was determined for the I.N.G. λ3914 band of N_2^+ by subtracting e emission intensity originating in the dark atmosphere from the total measured intensity. he method is based on the constancy of the ratio of emission intensity of the oxygen green ne $0I$ λ5577 to the λ3914 emission in the dark atmosphere. The ion density of N_2^+ is com- ıted as a function of height from the emission rate per unit volume. *Subject Headings:* **Auroral photometry 2. Auroral nitrogen bands 3. Oxygen lines.**—*Author's abstract.* Ⓢ

11.7–149 537.533:546.17

†*Silverman, Sam and Lassettre, E. N., **Electronic collision cross sections for nitrogen at xcitation energies from 10 to 80 electron volts.** Ohio. State Univ. Research Foundation, ontract AF 19(122)-642, Scientific Report, No. 8, June **1957.** 37 p. 31 figs., 23 tables, refs., eqs. **DWB** (M055 O37sc)—Collision cross sections and generalized oscillator strengths ave been determined for each of thirteen transitions in nitrogen whose excitation energies lie

in the interval 10 to 83 ev. Incident kinetic energy was approximately 500 volts in each case. For each peak in the nitrogen spectrum in the above range an integrated oscillator strength has been determined by integrating over the spectrum from the minimum at one side of the peak to the minimum at the other side. By extrapolating to $(\Delta P)^2=0$ the quantities f_0 which would equal the optical oscillator strengths if the Born approximation is valid, have been determined. Even at excitation energies as high as 80 ev the optical oscillator strengths are still not negligible. The oscillator strengths have been employed in a test of the oscillator sum rule and for calculation of refractive indices. A discrepancy has been encountered in the case of the latter quantity which is as yet unexplained. *Subject Heading:* **1. Nitrogen excitation.** —*Authors' abstract.*

11.7–150 535.33

Takayanagi, K. (*Dept. of Physics, Univ. College, London*), **Rotational transition of hydrogen molecules by collision.** (In: **The threshold of space,** ed. by M. Zelikoff. N. Y., Pergamon Press, **1957.** p. 191–193. 2 figs., 7 refs., eqs.) **DLC**—A method is shown to compute the rotational or vibrational transition probabilities in order to explain the spectral intensity distribution. Some preliminary numerical results are given. *Subject Heading:* **1. Spectral theories.**—*A.A.*

4. GEOMAGNETISM

See also: **Geomag. effects on ionosphere** (Rastogi), 11.7–140; **Geomag. yearbooks,** 11.7–244

11.7–151 550.384

Rikitake, T., [**Some comments on**] **J. S. Chatterjee: Induction in the core by magnetic storms and earth's magnetism.** *Journal of Geophysical Research,* Wash., D. C., 62(3):493–494, Sept. **1957.** 4 foot-refs., 3 eqs. **DLC**—The author questions the theory of CHATTERJEE (see 7.10–18, Oct. 1956, *Met. Abstracts*) that the earth's magnetic field is built up by induction produced by successive geomagnetic storms. It would take 10^{2200} storms to build up the present geomagnetic field, this way, or if only 1/100 of the field were produced in this way, it would take 10^{20} years, whereas the age of the earth is more like 10^{10} years. Furthermore Chatterjee's theory cannot account for the secular variation or the reversal of the earth's polarity (if it occurred). *Subject Heading:* **1. Geomagnetic theories.**—*M.R.*

11.7–152 550.385.4:551.521.67

Briunelli, B. E., **Istolkovanie rezul'tatov izucheniia geomagnitniykh vozmushcheniĭ korpuskuliarnogo kharaktera.** [Interpretation of the results of studies on geomagnetic disturbances of the corpuscular type.] (In: Akademiia Nauk SSSR. Komissiia po Issledovaniiu Solntsa, **Fizika solnechnykh korpuskuliarnykh potokov i ikh vozdeĭstvie no verkhniuiu atmosferu zemli.** Moscow, **1957.** p. 131–143. 6 figs., 9 refs., 18 eqs.) **DLC** (QB531.A5)—Charts are presented to show time (aperiodic) variations or anomalies in geomagnetic (horizontal, vertical and inclination) readings during the 48 hrs immediately after the onset of a magnetic storm, and possible current systems that would give rise to observed anomalies of 250 kA. The storms, the Chapman-Ferraro theories and the Alfvén theories are described and illustrated in an attempt to interpret results critically in the light of the corpuscular current hypothesis. *Subject Headings:* **1. Geomagnetic disturbances due to solar corpuscles 2. Corpuscular theories of geomagnetic storms 3. Geomagnetic theories.**—*M.R.*

11.7–153 550.385.43

Srinivasamurthy, B. (*Kodaikanal Observ.*), **Sudden commencements and impulses in Kodaikanal magnetograms: their hourly frequency.** *Indian Journal of Meteorology and Geophysics,* Delhi, 10(2):209–212, April **1959.** 2 figs., 2 tables, 10 refs. **DWB, DLC**—The diurnal variation in the frequencies of sudden commencements (SCs) and sudden impulses (SIs) at Kodaikanal (10.2°N, 77.5°E) is analyzed from the data for the period 1949–1957. The hourly frequency curve of SCs and SIs (combined) has little resemblance to the curve obtained by NEWTON from his analysis of Greenwich-Abinger records. The results of harmonic analysis show a nearly semidiurnal trend in the distribution of storm sudden commencements (SSCs); this, however, is small. The hourly frequencies of SIs show a significant diurnal variation with an afternoon maximum and a forenoon minimum and a secondary minimum

round 18 h local time and a secondary maximum around 08 h. These results are also compared with those obtained by FERRARO, PARKINSON and UNTHANK. *Subject Headings:* **Sudden commencement frequencies 2. Diurnal sudden commencement variations 3. Kodaikanal, India.**—*Author's abstract.* Ⓢ

11.7–154 550.385:551.590.22

Egedal, J., **The lunar-diurnal magnetic variation and its relation to the solar-diurnal variation.** *Journal of Geophysical Research*, Wash., D. C., 61(4):748–749, Dec. **1956.** table, refs., eqs. **DLC**—An earlier suggestion by the author regarding the relation solar-diurnal variation and lunar-diurnal variation of magnetic field was not borne out by data. Night-time data for Amberley, New Zealand, were examined and show large variations not related to solar-diurnal effects nor related to the ionization of the upper atmosphere. The variation may be due to local oceanic currents which contain a lunar-diurnal term. *Subject Headings:* **Magnetic field variations 2. Lunar diurnal magnetic variations 3. Solar diurnal magnetic variations 4. New Zealand.**—*S. Fritz.*

11.7–155 550.385

†Tamao, Tsutomu (*Geophysical Inst., Tôhoku Univ.*), **Distortion of the outer geomagnetic field.** *Tôhoku Univ. Sendai, Japan, Science Reports, 5th Series, Geophysics*, 9(1):1–21, July **1957.** 9 figs., 29 refs., numerous eqs. **DWB, DLC**—Considering the following condition—that interplanetary space and the earth's upper atmosphere are conducting gas while there are relative motions between them, we may expect that the outer geomagnetic field is distorted from the geomagnetic dipole distribution. Using a simple model, in which hydromagnetic equilibrium conditions are satisfied (electromagnetic force balances gas pressure gradients), we can calculate radial, latitudinal variations of the magnetic field and distributions of magnetic lines of force, etc., for some cases. From these results, it is shown that the westward toroidal magnetic field predominates in the transition equilibrium region and this field probably corresponds to SIMPSON'S westward shift of the geomagnetic equator. A possible mechanism of maintenance of these fields is briefly discussed. *Subject Headings:* **1. Geomagnetic field distortion 2. Geomagnetic variations.**—*Author's abstract.*

11.7–156 550.385(548.4)

Yacob, A. (*Colaba Obs., Bombay*), **Some features of magnetic elements at Trivandrum and Annamalainagar, situated near the geomagnetic equator in the Indian Peninsula.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(4):377–392, Oct. **1959.** 5 figs., 5 tables, refs. **DWB, DLC**—The *Sq* diurnal variation in *H* at Trivandrum and Annamalainagar are found to be large compared with those at Alibag. The quiet day range in *H* at Trivandrum in the month of March is abnormally large. Though the *Sq* variations in *V* at Trivandrum are not abnormal they are larger than those at Annamalainagar and Alibag. The response of the *H* elements to disturbance at Trivandrum, Annamalainagar as well as Alibag are similar in sense. But the *V* element at Annamalainagar shows a difference in its response to disturbance. When the *V* elements at both Alibag and Trivandrum show an increase in numerical magnitude the *V* element at Annamalainagar shows a decrease and vice versa. When the magnitudes of disturbance are examined they are found to be almost the same in the *H* element at all the observatories (including Alibag) during night hours. But during the day the magnitudes of disturbance in *H* element at Trivandrum and Annamalainagar are always greater than that at Alibag, a station away from the geomagnetic equator. Effects of disturbance in the *V* element are greatest at Trivandrum both during the day as well as the night. The lines of force of an average disturbance field in a longitudinal plane over the region of the Indian Peninsula appear to be smooth curves with their concave side turned upwards, their turning points occurring between Annamalainagar and Alibag during the day and close to Alibag in the night. *Subject Headings:* **1. Geomagnetic field variations 2. Trivandrum, India 3. Annamalainagar, India.**—*Author's abstract.* Ⓢ

11.7–157 551.542.1:550.385.4

London, Julius; Ruff, Irwin and Tick, Leo J., **The relation between geomagnetic variations and the circulation at 100 mb.** *Journal of Geophysical Research*, Wash., D. C., 64(11):1827–

1833, Nov. **1959.** 5 figs., 9 refs. **DLC.** Also issued as: N. Y. Univ. College of Engineering Research Div. Dept. of Meteorology and Oceanography, Contract AF 19(604)-1738, Scientifi Report No. 8, Feb. **1959.** 22 p. 8 figs., table, 16 refs., 2 eqs.—Statistical methods are use to study the relationship, over a 5-year period, between geomagnetic storms and the heigh gradients of the 100 mb surface over the U. S. In the case of the superposed epoch analysis the parameters studied were variations from population values of the mean height gradient and the standard deviation of the height gradients for the period 5 days before to 15 day following the geomagnetic storm. No pattern was found in the test statistical significanc at the 5% and 1% levels. The geomagnetic and height gradient spectra were constructe from the two time series and the coherence between the two series was computed. Th coherence was found to be very small for all periods from 4 to 60 days. The conclusion i drawn that there is no obvious relationship between the two sets of data. *Subject Heading* **1. Geomagnetic storm-pressure-height gradients relationships.**—*Authors' abstract.* Ⓢ

11.7–158 523.75:550.385.

Hansen, Richard T. (*High Altitude Obs.*), **Recurrent geomagnetic storms and sola prominences.** *Journal of Geophysical Research*, Wash., D. C., 64(1):23–25, Jan. **1959.** 3 figs 15 refs. **DLC**—A study is made of the run of areas of solar prominences around days o recurrent geomagnetic storms during the period 1917–1944. "Character figures for dark *H* alpha flocculi," taken from *IAU Quarterly Bulletins of Solar Activity*, are used as the measur of prominence areas. The earlier suggestions that the solar *M*-regions may be identified a quiescent prominences have not been confirmed. *Subject Headings:* **1. Solar prominence 2. Geomagnetic storms 3. Solar-geomagnetic relationships.**—*Author's abstract.* Ⓢ

11.7–159 551.509.336:550.38:523.

†Hansen, Richard T. (*High Altitude Obs.*); Warwick, Constance S. and Wood, Marion F (*both, Natl. Bu. of Standards*), **Studies in solar-geomagnetic relations, Pt. 1, Optical criteria** *U. S. National Bureau of Standards, NBS Report*, No. 5570, May 12, **1958.** 46 p. 75 figs 60 refs., eqs. **DWB**—The study investigates the dependence of forecasting and associate solar phenomena and geomagnetic disturbance on the time factor in the solar activity cycl and report evaluates the usefulness of these relationships in forecasting. The manual cover the method adopted for such an analysis and tests, the classification of flares, the corona an prominences, the indices for active regions, etc. *Subject Headings:* **1. Solar-geomagneti relationships 2. Solar-weather relationships.**—*N.N.*

11.7–160 551.521.67:550.3

Sinno, Kenzi (*Hiraiso Radio Wave Obs. Radio Research Labs., Japan*), **On the origin o the long-lived solar corpuscular streams which appeared last solar cycle, 1950–53.** *Journal Atmospheric and Terrestrial Physics*, London, 15(1/2):151–155, Sept. **1959.** 3 figs., 5 refs **DLC.** Also issued in: *Japan. Science Council. Ionosphere Research Committee, Report o Ionosphere Research in Japan*, 10(4):250–260, **1956.** 11 figs., 9 refs. **DWB**—It is well know that the geomagnetic variation shows a marked 27-day recurrence tendency, especially whe the solar activity is on the decrease. In the decreasing epoch of solar activity (1949–1954 the remarkable recurrences of the geomagnetic variation developed without exception. Be sides, we verified through investigation by BARTELS' 27-day diagram that the vernal an autumnal maxima belonged to different series of the recurrences which appeared alternatel in this period. For explanation of the above phenomena, the correlations between geo magnetic activities and solar coronal intensities are examined. It is concluded that th heliographic latitude of coronal intensity and the geomagnetic variation play an importan role in these correlations. The corona directed to the earth (e.g., the northern corona i autumn when the earth comes to the north of the heliographic equator and the southern coron in spring when the earth comes to the south of the heliographic equator) shows a remarkabl negative correlation with the geomagnetic variation. And the position, form and speed of th corpuscular stream which affects the geomagnetic variation are discussed from the standpoin of intercorrelations with the geomagnetic variation. *Subject Headings:* **1. Solar corpuscula radiation 2. Solar-geomagnetic relationships.**—*Author's abstract.* Ⓢ

11.7–161 550.385:523.5

Hawkins, Gerald S. (*Boston Univ.*), **A search for magnetic effects from meteors.** *Journal of Geophysical Research*, Wash., D. C., 63(3):467–475, Sept., **1958.** 4 figs., 2 tables, 4 refs., eqs. **DLC**—A magnetometer was operated in conjunction with the Super-Schmidt cameras of the Harvard Meteor Project. No magnetic pulses were detected from meteors with visual magnitudes between +5 and −3. The minimum signal detectable with the equipment was 5×10^{-2} gamma in the first series of measurements, and was subsequently reduced to 3×10^{-3} gamma. This result is in direct contradiction with the work of A. G. KALASHNIKOV, and reasons for the discrepancy are discussed. *Subject Headings:* **1. Magnetic effects from meteors 2. Meteors.**—*Author's abstract.*

11.7–162 550.382.3

*Angenheister, G. (*Hannover*), **Der gegenwärtige Stand der paläomagnetischen Forschung.** [Current status of palaeomagnetic investigation.] *Geologische Rundschau*, Stuttgart, 46(1): 87–99, **1957.** 3 figs., 11 tables, 15 refs. **DLC**—The cause of the natural residual magnetism of rocks and the difficulties arising in relation to the interpretation of palaeomagnetic measurements are considered. A method is described by which different researchers attempt to obtain knowledge of the location of the pole in past geological times. Reference is made to the fact that this method is based upon hypotheses, correctness of which is beyond direct proof. The different locations of the pole in early geological times are indicated in a table (by IRVING) as the results of palaeomagnetic measurements. The figures given are only valid to the present time and certainly will be subject to change in the future. *Subject Headings:* **1. Paleomagnetism 2. Paleomagnetic measurements.**—*Transl. of author's abstract.*

5. RADIO ASTRONOMY

See also: **Radio astron.** (Pfeiffer), 11.7–20.

11.7–163 523.164.42 551.510.535:551.594.12

Chivers, H. J. A. and Greenhow, J. S. (*both, Univ. of Manchester, Jodrell Bank Experimental Station*), **Auroral ionization and the absorption and scintillation of radio stars.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 17(1/2):1–12, Dec. **1959.** 6 figs., 15 refs. **DWB, DLC**—The absorption of the radiation from extraterrestrial radio sources, when observed at low elevations to the north of Jodrell Bank (geomag. lat. 56°), is discussed. At lower culmination the Cygnus radio source is at an elevation of only 4°, and the line of sight to the source then passes through the ionosphere near the zone of maximum auroral activity. Combined observations of the source intensity at 36 Mc/s and 100 Mc/s, and of radar back-scatter echoes at 36 Mc/s, have been made using the 250 ft steerable telescope. The absorption and certain back-scatter echoes can be related to an ionized layer at a height of the order of 100 km, associated with auroral activity. It is shown that with a high sensitivity radar equipment at 36 Mc/s, weak auroral-type echoes from irregularities in the E region aligned along the earth's field occur on about 40% of all days at quite low geomagnetic latitudes. The suggestion is made that the scintillation of radio stars observed from latitudes similar to that of Jodrell Bank is not due entirely to irregularities in the F region, but that there is a large contribution from these aligned irregularities at E region heights. *Subject Headings:* **1. Auroral ionization 2. Radio star scintillation 3. Radiation absorption.**—*Authors' abstract.* Ⓢ

11.7–164 621.396.8:523.746:550.385

Chivers, H. J. A. (*Univ. of Manchester, Jodrell Bank Exper. Sta.*) and Wells, H. W. (*Carnegie Inst., Wash.*), **Observations of unusual radiofrequency noise emission and absorption at 80 Mc/s.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 17(1/2):13–19, Dec. **1959.** 2 figs., 2 tables, 11 refs. **DWB, DLC**—Unusual radiofrequency noise emissions at 80 Mc/s have been identified during periods of solar activity. The noise enhancements may be classified as (1) smooth, bay-like disturbances lasting for approximately 1 hr which occur in both day and night hours, and (2) abrupt increases, often of large but fluctuating amplitude which occur within a few hours of local midnight. The smooth enhancements occur almost simultaneously

with the absorption of radiation in a sector of the northern sky. These effects could be caused by transit of high velocity streams of charged particles which produce emission from F region levels and absorption in the E region or below. The abrupt noise bursts at night are from the northern sky and seem to be associated with pronounced changes in the horizontal component of the earth's magnetic field. The noise may be a form of "auroral" radiation or may arise from propagation of solar noise outbursts from the sunlit to the dark hemisphere. *Subject Headings:* **1. Sunspot-magnetic storm relationships 2. Sunspot effects on radio communication systems 3. Auroral radiation.**—*Authors' abstract.* Ⓢ

11.7–165 523.164.08

Giant radio telescope in Parkes, 200 miles west of Sydney. *Australian Journal of Science*, Sydney, 21(3):79, Oct. **1958. DLC**—Brief information relating to the $500,000.00 radio telescope to be erected and in full operation toward the end of 1961 in the vicinity of Parkes, about 200 mi west of Sydney, Australia, is given. The telescope will have a 210 ft diameter parabolic reflector mesh covered and mounted in a reinforced concrete tower so as to permit pointing accurately at sky targets more than 30° above the horizon. Although the diameter is less than that of the only other existing giant telescope (Jodrell Bank, near Manchester, Eng.), it is expected to surpass the latter's accuracy of surface and pointing. *Subject Headings:* **1. Radio telescopes 2. Parkes, Australia.**—*W.N.*

11.7–166 621.396.8:523.8:551.510.535

Ko, H. C. (*Radio Obs., Dept. of Elec. Eng., Ohio St. Univ.*), **Amplitude scintillation of extra-terrestrial radio waves at ultra-high frequency.** *Institute of Radio Engineers, N. Y., Proceedings*, 46(11):1872, Nov. **1958.** 3 figs. **DWB**—Radio stars exhibit fluctuations because of the irregularities in the earth's ionosphere. These irregularities have different radio frequency refractive indexes and thus present some important effects on the propagation of radio waves. Scintillation measurements made from Ohio State University Radio Observatory (lat. 40°01′N; long. 83°03′W) are reported. This is a preliminary report on research that is continuing. *Subject Headings:* **1. Radio star scintillation 2. Ionospheric effects on radio stars.** —*N.N.*

6. ASTRONAUTICS—SATELLITES

11.7–167 629.19(08)

American Astronautical Society, **Advances in astronautical sciences: proceedings of the 5th annual meeting of the AAS, Nov. 1958 (i.e., Dec. 27–31, 1958), Wash., D. C.** N. Y., Plenum Press, **1959.** 460 p. figs., tables, refs., eqs. **DWB** (629.1388 A512pro), **DLC** (QB1.A26)—A group of 40 papers on various aspects of astronautics read at the Fifth Annual Meeting, Dec. 27–31, 1958 in Wash., D. C., are presented, grouped under 6 major headings: I) Upper atmosphere research; II) Space vehicle design; III) Guidance and instrumentation; IV) Satellite mechanics; V) Rocket and satellite astronomy and exploration of upper atmosphere; VI) Man's environment in space. Papers of interest to meteorologists are those by J. A. Van Allen, J. W. Townsend, S. F. Singer, P. A. Goldberg, H. Friedman and Malcolm Ross. These are abstracted separately. *Subject Headings:* **1. Astronautics. I. Advances in Astronautical Sciences.**—*M.R.* Ⓢ

11.7–168 521.1:551.507.362.2

Roy, Maurice, **Sur un aspect des relations entre la mécanique et les satellites artificiels de la Terre.** [An aspect of the relationships between mechanics and artificial earth satellites]. *Académie des Sciences, Paris, Comptes Rendus*, 249(16):1424–1425, Oct. 19, **1959. DWB, DLC**—Investigation from a purely mechanical point of view of the orbiting in space of artificial satellites. The orbiting of the earth's artificial satellites achieved by this time, raises the question of the validity of the classical Newtonian form of the law of attraction close to the principal attracting body, and makes it possible to investigate it accurately. The author points out the advantage of the preferential use of equatorial satellites for fundamental research in mechanics. The launching of satellites with fairly equatorial and sufficiently prolate orbits, and the resort to a chain of observing stations distributed in quincunx in the vicinity of the equator on a sufficient range of longitude, should offer favorable conditions for a program

of spatial research of fundamental interest to mechanics while aiming to improve particularly the scientific cognizance of the three following points: distribution of land masses, resistance of medium and value of the negative exponent of the attraction distance in the almost Newtonian law of gravitation. *Subject Headings:* **1. Celestial mechanics 2. Satellite observatories.** —*A. V.* Ⓢ

11.7–169 523.3:629.19

Barnes, John L. (*Pres., Systems Corp. of America*), **The scientific and engineering exploration of the moon.** *U. S. Air Force. Office of Scientific Research, Vistas in Astronautics: Second Annual Symposium, April 1958.* pub. N. Y., Pergamon Press, **1959.** p. 255–260. refs. **DWB** (629.1388 U581as)—Scientific and engineering problems connected with lunar exploration by manned vehicles: earth satellites, moon bases, material capture, seismic transmission, lunar satellites and landings and other engineering type experiments are discussed in outline form. *Subject Headings:* **1. Interplanetary vehicles 2. Lunar exploration.**—*M. R.* Ⓢ

11.7–170 629.19:539.1

Konecci, E. B.; Trapp, R. F. and Hunter, M. W. (*all, AFIAS, Douglas Aircraft Co., Inc.*), **Manned nuclear space systems, Pt. 1, High-thrust nuclear systems.** *Aero/Space Engineering*, N. Y., 19(1):34–41, Jan. **1960.** 7 figs., 3 tables, 7 refs. **DLC**—The feasibility of manned nuclear systems for interplanetary flight is the subject of this paper, divided into two parts, of which Pt. I is published here. Pt. II will be devoted to the low-thrust electrical propulsion system, including a review comparison of the high- and low-thrust systems. Pt. I discusses the high-thrust nuclear system in the performance of a particular Martian mission. The details of the proposed mission are outlined and the propulsion and time factors are considered. Then, radiobiological, life-support, and radiation shielding problems are taken up. Finally, the general conclusions of the present analysis of the chosen nuclear mission to Mars are discussed. It is stated that a three-man Martian expedition with a 55,000 lb payload is feasible using two stage nuclear vehicles. Several tables and diagrams appear featuring the technical details of the mission. *Subject Headings:* **1. Interplanetary flights 2. Mars 3. Nuclear propelled interplanetary vehicles.**—*F. S.* Ⓢ

11.7–171 551.5:629.19

Berkner, Lloyd V., **Geography and space.** *Geographical Review*, N. Y., No. 49(3):305–314, July **1959. DWB, DLC**—The potentialities of space exploration and its applications in meteorological studies of meteoric dusts, the observation of cyclogenesis, thunderstorms, cosmic rays and atmospheric gas are discussed. Through space exploration it will be possible to map cloud and storm systems all over the earth. *Subject Headings:* **1. Space flights 2. Meteorological research space flights.**—*N. N.* Ⓢ

11.7–172 531.52:531.56:551.510.5

Garber, T. B. (*Rand Corporation*), **On the rotational motion of a body re-entering the atmosphere.** *Journal of the Aero/Space Sciences*, N. Y., 26(7):443–449, July **1959.** 6 figs., refs., 85 eqs. **DWB, DLC**—The exact equations of motion of a body acted upon by aerodynamic and gravitational forces are formulated, using inertial axes fixed in a spherical, nonrotating earth. With the assumption that the spin rate of the vehicle is constant and of such a magnitude that Magnus forces may be ignored, expressions are developed for the applied forces and moments of forces. After considering the nature of a typical re-entry path, the equations of motion are linearized, and the translational and rotational modes are uncoupled. With the assumption that the translational equations may be independently solved, the rotational equations of motion are reduced to two coupled linear equations with known variable coefficients. A solution of the planar case is obtained, utilizing a modified WKBJ approximation method. This technique is extended to the coupled case. The stability of the oscillations is examined, and the conclusion is drawn that the oscillations are bounded for a statically stable, spinning vehicle if C_{L_α} is positive. A brief investigation is made of the forced solutions, and finally a comparison of the results of this paper with those of previous studies is made. *Subject Headings:* **1. Satellite re-entry 2. Re-entry into the atmosphere.**—*Author's abstract.* Ⓢ

11.7–173 523.3:629.19

Gazley, Carl, Jr. and Masson, David J. (*both, Rand Corp., Santa Monica, Calif.*), **Recovery of a circum-lunar instrument carrier.** *International Astronautical Congress, Proceedings of the 8th Congress, Barcelona, 1957*, issued Vienna, **1958.** p. 137–146. 5 figs., 14 refs., 7 eqs. English, German and French summaries p. 137. **DLC** (TL878.I44)—The possibility of the physical recovery of a circum-lunar vehicle widens the scope of scientific investigations possible for a vehicle with lunar capabilities. While a very high guidance capability is necessary to impact such a recoverable vehicle within a given area on the earth's surface, only moderate accuracy is required to effect just a return to earth. Radio tracking during return would enable prediction of the approximate impact point. Ultimate recovery could be accomplished through a radio beacon and overflight search. While the penetration of the earth's atmosphere involves more severe decelerations and heating than in the case of the recovery of a scientific satellite, the magnitude of the deceleration poses few structural difficulties and the use of a vaporizing surface for heat absorption does not require an excessive weight penalty. *Subject Headings:* **1. Satellite re-entry 2. Circum-lunar satellites.**—*Authors' abstract.*

11.7–174 551.507.362.1:523.3

Petri, Winfried, **Die erste Photographie der Rückseite des Mondes.** [The first photograph of the far side of the moon.] *Umschau*, Frankfurt a.M., 59(22):694–695, Nov. 15, **1959.** 2 figs., table, ref. **DLC**—With the aid of a diagram, the author describes the operation and instrumentation of "Lunik III" which, on Oct. 7, 1959, obtained a photograph of the far side of the moon. The path of the satellite is given and the photograph obtained is reproduced. *Subject Headings:* **1. U.S.S.R. satellites 2. Lunik III 3. Satellite instrumentation 4. Moon backside photography.**—*I.L.D.* Ⓢ

11.7–175 551.507.362.1:523.3

Soviet moon rocket. *Journal of Scientific and Industrial Research, Sec. A.*, New Delhi, 18(10):453, Oct. **1959. DWB, DLC**—A short paper on the launching on the moon of the second Russian space rocket Lunik II. Lunik II reached the moon at 2 hr 32 min 24 sec I.S.T. on Sept. 14 after a flight of about 34 hr. The paper gives information about the launching details and the equipment carried by the rocket. The Russian launching of an automatic interplanetary space station on Oct. 4 is also reported. This space station was built to permit the study of the 40% of invisible territory of the moon, and supply new information on outer space. *Subject Headings:* **1. U.S.S.R. satellites 2. Lunik II 3. Soviet interplanetary space stations 4. Satellite instrumentation.**—*I.S.* Ⓢ

E. SOLID EARTH GEOPHYSICS

1. VOLCANOLOGY

11.7–176 550.371:551.21

Yoshimatsu, Takasaburo, **Changes of earth-current potentials at Kanoya and activities of the volcano Sakurajima.** *Kakioka, Japan. Magnetic Observatory, Memoirs*, 9(1):57–63, March **1959.** 2 figs., 8 refs. In Japanese; English summary p. 57. **DWB**—Abnormal changes of the monthly mean values of earth-current potentials observed at Kanoya, Kagoshima Prefecture, were examined by studying the relationship to the activity of the volcano Sakurajima (about 27 km northwest of Kanoya), whose latest moderate eruption occurred on Oct. 13, 1955 and was followed by many minor volcanic eruptions and microtremors up to the middle of March 1957. It was found that the deduced value of earth potentials, $f(t)=\Delta N-\overline{\Delta N}+\alpha P$, shows an intimate connection with the volcanic activity which may be responsible for the changes of the state of magma in the deeper part of the volcano, where ΔN is the deviation for each month from the general linear trend assumed of the monthly mean values, $\overline{\Delta N}$ the mean value of ΔN in the calm period of the volcanic activity 1952–54, P the monthly total number of microtremors, and α a constant. *Subject Headings:* **1. Earth currents 2. Volcanic effects on earth currents.**—*Author's abstract.*

2. GEOMORPHOLOGY

See also: **Zbara formation, Algeria** (Capot-Rey), 11.7–318; **Geomorphology of arid lands** (Vogt), 11.7–376.

11.7–177 550.1:551.24

†Gorelov, S. K., **Geomorfologiia i noveĭshaia tektonika pravoberezh'ia nizhneĭ volgi.** [Geomorphology and latest tectonics of the right bank of the Lower Volga.] *Akademiia Nauk SSSR. Institut Geografii, Trudy*, 73, **1957.** 139 p. 37 figs., 8 tables, bibliog. p. 133–39. **DLC**—This is a geomorphological study of the right bank of the Lower Volga—the egion includes the construction side of the Stalingrad Hydrocenter and of the expansion of the uture Stalingrad water reservoir. The 4 chapters deal with: 1) a brief outline of the history f geomorphological investigation; 2) the main stages of geological history; 3) the geomorpho- ogical structure of the Lower Volga right bank; and 4) the development of the topography and ecent tectonics. *Subject Headings:* **1. Geomorphology 2. Tectonics 3. Volga River.**—*M.P.*

11.7–178 550.1(02)

†Maull, Otto (*Univ. Graz.*), **Handbuch der Geomorphologie.** [Handbook of geomor- hology.] 2d rev. and enlarged ed. Vienna, Verlag Franz Deuticke, **1958.** 600 p. 53 figs., 1 photos, 16 tables, bibliog. p. 501–574. Price: 74 DM. (1st ed. 1938 with title **Geomor- hologie.**) **DLC** (GB53.M35). Review by S. Müller in *Zeitschrift für Meteorologie*, 13(7/8): 98, July/Aug. **1959.**—A second edition of a voluminous text on all phases of geomorphology—ackground and history, analytic geomorphology (weathering; polar, alpine, arid and humid round conditions; denudation, accumulation, erosion, Karst; snow, glaciers and glacial action; round erosion and accumulation; deserts, marine and lake formation of land and coastal areas) nd systematic geomorphology. A tremendous bibliography of at least 2000 references is rranged by general subject areas: history, methods, weathering, denudation, rivers and river ction, valley formation, mountains and basins, Karst, snow, glaciers and glaciation, wind ction and deserts, and sea action and coasts. A complete author and subject index is ap- ended. Not much seems to have been added to the bibliography of the 2nd edition except few recent titles. *Subject Headings:* **1. Geomorphology textbooks 2. Geomorphology ibliographies.**—*M.R.*

F. OCEANOGRAPHY AND HYDROLOGY

1. OCEANOGRAPHY

See also: **Pressure effects on sea level** (Zubov), 11.7-298; **Sound transmission in sea water** (Urick, Hoover), 11.7–398.

11.7–179 551.46(02)

†Rouch, J., **Les découvertes océanographiques modernes.** [Modern oceanographical iscoveries.] Paris, Payot, **1959.** 251 p. 22 figs., tables, bibliog. p. 234–241. **DWB** 551.46 R854de)—This volume is a complement to the 3 volume **Treatise on physical ocean- graphy** taught at the Oceanographic Institute at Paris (1948). The subject matter concerns: Oceanographic soundings, bathymetric charts and bottom conditions; II. Characteristics of ea water, temperature, salinity, optics and ice; and III. Movements of sea water, waves, tides nd currents. An introductory chapter goes into the history and expeditions since the last ar. Emphasis is on recent research and methods and the treatment is nonmathematical. *ubject Headings:* **1. Oceanographic investigations 2. Oceanography textbooks.**—*M.R.*

11.7–180 551.582.3:551.587(264)

*†U. S. Office of Naval Operations, **U. S. Navy marine climatic atlas of the world, Vol. 4, outh Atlantic Ocean.** Its *NAVAER* 50-1C-531, Sept. 1, **1958.** xvii p. 267 charts, 33×50 n. (For abstract on Vol. 1, North Atlantic Ocean, *see* 8.5–81; Vol. 3, North Pacific Ocean, *e* 8J–116; Vol. 3, Indian Ocean, *see* 9.11–29; Vol. 1–4, *see* 11A–92, 11-A, *Met. Abstracts.*)

DWB—Atlas contains monthly charts of surface winds and gale roses, visibility, precipitation, cloudiness, wind-visibility-cloudiness, dew point, temperature, wet bulb temperature, temperature and wind speed, sea level pressure, air-sea temperature difference, upper air wind roses, aid and retard, geopotential heights (850, 700, 500, 300 and 200 mb), temperature and humidity, modified refractive index, inversions, tropopause, height frequencies, height of freezing level and potential aircraft icing frequencies. A good list of references is included as well as a list of 30 upper air wind and 16 radiosonde stations with their coordinates and period of record for the South Atlantic area. Charts are nicely done in color with data on charts more legible and complete than in earlier editions. *Subject Headings:* **1. Marine climatic atlases 2. Upper air frequency charts 3. South Atlantic. I. U. S. Weather Bureau.**—*M.R.*

11.7–181 551.511.3:551.465 551.461.2

Biesel, F., **Hydraulique des plaques tournantes.** [The hydraulics of rotating plates.] *La Houille Blanche*, Grenoble, 14(5):586–597, Aug. **1959.** 5 figs. French and English summaries. **DLC** Paper includes: main features of Coriolis forces and their effect in the field of hydrodynamics; statement and justification of the similarity laws by analogy; importance of Coriolis forces in general in the study of tides; comparison of their order of magnitude with that of other forces involved such as friction, inertia, etc.; theoretical justification of the use of stationary models under certain conditions; use of Kelvin waves and the Bjerknes circulation theorem; applications to the English Channel; boundary condition problems and the method of "nesting" models. In conclusion, it is pointed out that engineers are in no way dismayed by this type of problem and that sufficiently reliable methods of analysis are available to define experimental paths to follow. *Subject Headings:* **1. Hydrodynamics 2. Sea currents 3. Oceanic tides 4. Coriolis effects 5. Bjerknes circulation theorem 6. Rotating plates.**—*Author's abstract.*

11.7–182 551.465

Evgenov, Nikolaĭ Ivanovich, **Morskie techeniia.** [Ocean currents.] Leningrad, Gidrometeoizdat, **1954.** 108 p. 33 figs., foot-refs. Second ed. issued **1957.** Both ed., **DLC** (GC231.E85)—General information on sea currents, their nature and significance are presented and discussed. Ch. 1 deals with the history of the studies of sea currents. Ch. 2 contains a classification of sea currents. Ch. 3 treats the problem of currents and of their importance for the sea regime and man's activity. Methods of the study of sea currents and instruments used for the measuring of currents are discussed in Ch. 4. The system of world ocean currents is explained in Ch. 5. *Subject Heading:* **1. Ocean currents.**—*A.M.P.*

11.7–183 532.59:551.46

*†Munk, W. H.; Snodgrass, F. E. and Tucker, M. J., **Spectra of low-frequency ocean waves.** *California. Univ. Scripps Institution of Oceanography, Bulletin*, 7(4):283–362, **1959.** 13 figs., 20 tables, 10 charts, 23 refs., numerous eqs. **DWB, DLC**—A thorough monograph covering a wide variety of studies of "quiet" ocean waves ranging from the very long period tsunamis (10,000 sec or nearly 3 hrs) to short period (20 sec) waves in the range of wind generated swell. Some of these waves are of <1 cm height or 1/100 the height of ordinary tide or swell. Both off-shore vibotron transducers and shore based recorders (digital and continuous recorders and pier tsunami recorders) were used and are discussed. Harmonic analysis was performed by electronic digital and analog computer techniques. A sample analysis was performed for data from Guadelupe Island and comparative cross-spectral analysis made for La Jolla and Oceanside (March, May, and Nov. 1952) and for Honolulu and Santa Monica. Theory, graphs of records and data and tables of data are liberally included. Over the continental shelf spectra show well defined peaks. Local bottom features play an important part. Some background noise comes from as far away as the Indian Ocean, perhaps. Tsunami spectra obtained in Southern California and at Honolulu (Great Kamchatka tsunami, Nov. 4, 1952) show energy levels 1000 or even 10,000 times as large as background. Peaks and troughs in records of all wave lengths and sources are discussed at some length and their causes hypothesized. *Subject Headings:* **1. Low frequency wave spectra 2. Ocean wave spectra.**—*M.R.*

11.7–184 519.2:551.465:532.593

Putz, R. R. (*Univ. of Calif.*), **Statistical analysis of wave records.** *Coastal Engineering Conference, 4th, Chicago, Oct. 1953, Proceedings*, pub. **1954.** p. 13–24. 7 figs., refs. **DWB**—The establishment of quantitative relationships between recorded wave-system characteristics and other phenomena requires numerical description of the wave record. Current concepts applied to time histories of wave activity at a point are discussed. Characteristic statistical regularities found in wave measurements are described. Examples given show the application of statistical techniques to the description of wave systems in terms of the distribution of spectral energy as well as the distributions of "individual" wave heights and periods. Results from the prediction, from one point to another, of surface time histories illustrate the application of approximate spectral information. *Subject Headings:* **1. Ocean wave data analysis 2. Statistical analysis.**—*Author's abstract.*

11.7–185 551.461.2(262.8)(09)

Benashvili, I. A., **Uroven' Kaspiiskogo moria ego proshloe, nastoiashchee i budushchee.** [Level of the Caspian Sea: its past, present and future.] Leningrad, Gidrometeoizdat, **1948.** 22 p. 7 figs.—In this rather popular article, the author considers the following, viz.: the atmospheric circulation and surface relief conditions which bring about the climatic difference between the north and south Caspian Sea, the temperature and seasonal regime of the north and south Caspian Sea, historical records on the extent and level of the Caspian Sea, fluctuations of the level of the Caspian Sea before 1830 when systematic measurements began to be made and from 1836 to the present, the nature of water balance and the water balance of the Caspian Sea, the causes of the secular, periodic and nonperiodic fluctuation of the level of the Caspian Sea, and future variations of the level of the Caspian Sea. *Subject Headings:* **1. Sea level changes 2. Caspian Sea.**—*I.L.D.*

11.7–186 551.351 551.417:551.556.8

Arbey, François, **Observations nouvelles sur les croissants et sinuosités de plage.** [New observations on beach cusps and beach meanderings.] *Académie des Sciences, Paris, Comptes Rendus*, 248(22):3187–3189, June 1, **1959.** 6 figs., 4 refs. **DWB, DLC**—Statement of observational results specifying that the processes which lead to the formation of beach cusps and beach meandering are quite different. Author shows the influence of meandering on the morphology of adjoining submarine bottoms. *Subject Headings:* **1. Beach cusps 2. Beach meandering 3. Wind effects on sand.**—*A.V.*

11.7–187 551.351 551.417:551.556.8(449.3)

Steinberg, Michel, **Quelques précisions sur les croissants de plage et les sinuosités dans la région de Saint-Aygulf (Var).** [Some observations about beach cusps and beach meandering in the region of Saint-Aygulf (Var).] *Académie des Sciences, Paris, Comptes Rendus*, 248(22): 3190–3192, June 1, **1959.** 3 figs., 2 refs. **DWB, DLC**—Beach meandering is distinctly affected by the local oceanographic conditions and is subject to migration; beach cusps may form on beaches with homogeneous granulometry. Beach cusps always form at the moment when swell is decreasing and appear when the energy of the sea is lessening where as beachmeandering, on the contrary, corresponds to an erosion phase of the beach; the number and amplitude are very clearly bound to the local oceanographic conditions. Beach meandering is more likely to appear on wide beaches exposed to wind. Coexistence of these two formations, beach cusps and beach meandering, is possible. *Subject Headings:* **1. Beach cusps 2. Beach meandering 3. Wind effects on sand 4. Saint-Aygulf, France.**—*A.V.*

11.7–188 551.311.234.2(210.5)

Zenkovich, V. P., **Pol'sko-Sovestskie issledovaniia dinamiki peschanykh morskikh poberezhii.** [Polish-Soviet investigations of the dynamics of sandy seacoasts.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 3:127–128, **1958.** **DWB**—The methods and results of a study of sand particle displacement and accumulation dynamics organized by the Gdansk (Danzig) Marine Institute in cooperation with a team of the Soviet Institute of Oceanology experts in August–September 1957 on the sandy shores of Kel Peninsula. The purpose of the

study was to determine the speed of movement of sand masses and the places where they accumulate. The investigation was carried out with sand particles which had been rendered luminescent by exposure to ultraviolet radiation. A preliminary analysis of the results showed the possibility of establishing the most important displacement and accumulation phenomena of sand masses; this will be of great help in the future selection of sites for dike dams. *Subject Headings:* **1. Beach sand movement 2. Beach sand accumulation.**—*A.M.P.*

11.7–189 551.46.018:551.463

Sasaki, Tadayoshi; Watanabe, Seiichi; Oshiba, Gohachiro and Okami, Noboru, **Instrument for measuring angular distribution of submarine daylight.** *Tokyo. Institute of Physical and Chemical Research, Reports*, 34(3):163–170, May **1958.** In Japanese. Abstract in its *Abstracts*, 28:12, **1958. DWB**—Method of measuring angular distribution of submarine daylight has been studied and a new instrument constructed. The instrument is suspended down into the sea and the measurement is carried out by remote control from on board a ship. This instrument has proved to be serviceable for research work. Observations made on the distribution in horizontal planes at varying depths down to 80 m have led to a number of interesting results. *Subject Heading:* **1. Submarine light distribution measurement instruments.** —*Authors' abstract.*

11.7–190 551.46:591.9(26)

†Bruun, Anton F. (*Zoological Museum, Copenhagen*), **Deep sea and abyssal depths.** *Geological Society of America, Memoir*, No. 67 Vol. 1:641–672, Dec. **1957.** 9 figs., table, plates, bibliog. p. 669–672. **DLC** (QH542.N3)—Ecological zonation and characteristics of deep sea animal life are the main topics discussed here. The hydrosphere is divided into a warm troposphere and a cold stratosphere, for which the equivalent terms of thermosphere and psychrosphere are used in the discussion of the characteristics of each zone. The most useful ecological boundary is the 10°C isotherm in the psychrosphere which ranges from 100–700 m depth. The bathypelagic zone merges into the abyssopelagic zone at the 4°C isotherm which in the Atlantic is reached at 2000 m and in the Indian Ocean at 1000–1500 m depth. The unknown lower limit of the abyssopelagic zone may coincide with the abyssal zone at 6000 m depth. The terms hadel and hadopelagic have been suggested for the zones from 6000 m depth down to the farthest known sea depth at 10,863 m. Prior to the glacial age the temperature in abyssal and hadal may have been 4–10°C. Concentrations of O^{18} from a 4725 m deep core in the eastern Pacific indicated these temperatures at the following depths below top of the core: at 2–10, 282–290, 339–346 cm correspond to 10.3, 11.5 and 9.4°C all $\pm 0.5°$, respectively. The present temperature is about 1.3°C. The relatively sudden influence of the glacial age was the cooling of the water to <4°C which probably left few survivors. The considerations on the origin of the abyssal and hadal fauna are intentionally generalized since more research is needed to gain an understanding of the economy of the open sea. This is also discussed in terms of area, sediments, light, pressure, salinity, temperature, oxygen, etc. *Subject Headings:* **1. Animal ecology 2. Ecology of deep seas.**—*W.N.*

11.7–191 551.46:576.8

Kriss, A. E., **Mikrobiologicheskiĭ metod indikatsii gidrologicheskikh iavleniĭ v moriakh i okeanakh.** [Microbiological method of indicating hydrological phenomena in seas and oceans.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:18–24, May **1959.** 13 figs., table, 14 refs. **DWB, DLC**—The relatively high accumulation of microbe populations observed in the zone of temperature change, at the junction of cold and warm waters, or at the contact of fresh and saline waters, indicates the possibility of utilizing the sensitivity of the bacteriologic method as an index of a weak manifestation of heterogeneity in the structure of the waters of a sea or ocean. Such an investigation was carried out by the "SP-3" drifting polar station in the central Arctic, where a layer of water of Atlantic Ocean origin with an upper boundary at 200 m and a lower boundary at 1000 m is observed. The temperature difference amounted to only 1°C. A direct microscopic study of the vertical distribution of microorganisms in July and September 1954 when the drifting station was at lat. 88°N showed that the density of microbe population increased in the boundary layer between the upper cold and lower

Atlantic waters. At the lower boundary of the Atlantic current there was observed also an increase in microbe population in comparison with the upper and lower layers of water. The further development of direct microscopy has led to the use of microorganisms as hydrological indicators, i.e., using specific microbes to determine the origin of water masses. The presence of *Bacterium mycoides* in the Kara Sea indicates that waters from the Ob-Yenisei reach 92–93°E long. Particular microorganisms that cannot be artificially cultivated are especially suitable indicators of the origin of water masses of seas and oceans and of the quantitative properties of bodies of water produced by diverse courses. It was shown that the entire hydrogen sulfide zone of the Black Sea is colonized by characteristic filamentous shapes disintegrating into fragments. These bacteria feed upon hydrogen sulfides; in the hydrogen sulfide zone they number thousands per 1 ml as compared with tens per 1 ml in the oxygen zone. These microbes enter the upper layers of the Black Sea from the depths as a result of water exchange between the hydrogen sulfide and oxygen zone. Other examples of the use of microorganisms as indicators are cited. *Subject Headings:* **1. Microbiological method for ocean investigation 2. Oceanographic research 3. Arctic.**—*I.L.D.*

11.7–192 551.46(261.3)

Barsukov, Nikolaĭ Aleksandrovich; Probatov, A. and Shebalin, O., **Baltiĭskoe more: geograficheskiĭ ocherk.** [The Baltic Sea: a geographical outline.] Kaliningrad, Kaliningradskoe Knizhnoe Izd-vo, **1959.** 92 p. 16 figs., table. **DLC** (GC571.B3)—A small book giving standard, nontechnical facts about the history of exploration and research, geology, bottom relief, climate, currents, temperature and ice regime, salinity, illumination, waves, fluctuation of sea level, flora and fauna, history and industry of the Baltic Sea. The chapter on climate is very sketchy, whereas those on oceanography are somewhat more detailed. *Subject Headings:* **1. Oceanography of Baltic Sea 2. Baltic Sea.**—*M.R.*

11.7–193 551.583.13 551.553.21:551.526.6:551.46:639.2

Morgans, J. F. C. (*East African Marine Fisheries Res. Organization, Zanzibar*), **The sea we fish in.** *The East African Agricultural Journal*, Kikuyu, Kenya, 25(2):91–96, Oct. **1959.** 2 figs., 3 refs. **DLC**—The seasonal climatic changes of the East African coast are reviewed (SE monsoon from April to Oct., NE monsoon from Nov. to March) and studied for their influence on fish: under water climate and direction in which the sea currents move. The paper is based on B. S. NEWELL's (1957) first cruises and hydrographic results. The surface water consists of the East African Coastal Current (E.A.C.C.) which flows constantly northwards from the southern boundary of Tanganyika at least to Malindi, but it flows at different speeds in the two monsoons (from half a knot in NE monsoon to 3–4 knots in SE monsoon), with different temperatures (from 77°F in SE monsoon to 84° in March), different chemical composition (lowest salinity in May, maximum in Nov.–Dec.) and different thickness (60–70 fathoms towards the end of the SE monsoon and 30–50 fathoms in NE monsoon). During the SE monsoon, the E.A.C.C. forms a homogeneous layer, whereas during the NE monsoon it consists of a succession of rather homogeneous layers separated by thermocline layers. A relationship exists between the E.A.C.C. and the underlying Arabian Sea Water (A.S.W.) separated by a thermocline layer. The A.S.W. moves southwards, has a high salinity value, is colder than the E.A.C.C., is very depleted in oxygen (whereas the E.A.C.C. is rich in oxygen), and has a speed that might be in the order of 1 knot. The E.A.C.C. and A.S.W. harbor different types of fish and for some species the main thermocline is a potent boundary. It is also shown that seasonal changes of the E.A.C.C. affect the breeding of many species and are linked with migration. *Subject Headings:* **1. Climatic effects on fish 2. Monsoon fluctuations 3. Sea temperatures 4. Salinity distribution 5. East African Coast.**—*A.V.*

11.7–194 551.582.1(265)

Shliamin, Boris Aleksandrovich, **Beringovo more.** [Bering Sea.] Moscow, Gos. Izd.-vo geogr. Lit-ry, **1958.** 95 p. numerous figs. and foot-notes. **DLC** (GC841.S5)—A pamphlet giving some details of geography exploration, climate, coasts, ice currents, tides, water masses and fauna of the Bering Sea, illustrated with isothermal and other simple charts. *Subject Headings:* **1. Climate of Bering Sea 2. Oceanography of Bering Sea 3. Bering Sea.**—*M.R.*

11.7–195 551.465 551.461.2

Kitano, Kiyomitsu (*Tohoku Fish. Res. Lab., Shiogama, Japan*), **Observations of surface phenomena in ocean and coastal waters near Japan.** *Journal of Marine Research*, New Haven, Conn., 16(3):175–179, Oct. 15, **1958.** 4 figs., 7 refs. **DWB, DLC**—Surface phenomena of many kinds were observed from boats and aircraft over the Kuroshio Extension off the coast of Japan and from aircraft in the coastal area from Cape Inubo to Kinkazan. The distribution of these surface phenomena (both natural and artificial) have been correlated with observed oceanic conditions, principally areas of upwelling. *Subject Headings:* **1. Oceanographic research 2. Japan.**—*Author's abstract.*

2. SEA ICE

See also: **Drift ice met. stations** (Iakovlev), 11.7–248.

11.7–196 551.326.7

Anderson, Don L., **A model for determining sea ice properties.** *National Research Council, Wash., D. C., Publication* No. 598:148–156, Dec. **1958.** 5 figs., 5 refs., 9 eqs. **DLC, DWB** (551.311 A675pr)—The author first reports the configuration and amount of various constituents of sea ice and then discusses the various properties of sea ice. The sea ice crystals are bundles of small platelets of pure ice separated by layers of brine pockets. The temperature and salinity of the ice determine the brine content and these, along with the density, determine the air content. A very good idea of most of the physical properties of young sea ice can be obtained by knowing only the temperature and salinity. Density becomes a major factor in very thin ice and older (pack) ice. With reference to several laboratory experiments, a volume phase diagram for sea ice of several salinities is constructed and is printed with this paper for the first time (Fig. 1). With the help of the volume phase curves, attempt then is made to roughly determine various properties of the ice, such as thermal conductivity, electrical conductivity, strength, etc. *Subject Headings:* **1. Sea ice properties.**—*I.S.*

11.7–197 551.326.6:629.135.2

Betin, V. V.; Zhardinskiĭ, S. V. and Uralov, N. S., **Sposob instrumental'nykh avianabliudeniĭ nad materikovymi l'dami v more.** [Method of instrumental aerial observation of land ice in the sea.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:51–54, May **1959.** 3 figs., table, 8 eqs. **DWB, DLC**—The aerial clinometric device is provided with an automatically self-aligning perspective grid capable of measuring vertical and horizontal angles. The perspective grid is suitable for measuring linear and areal elements of continental ice viewed under angles of perspective from 30 to 72°. If the vertical angle exceeds 72° (the perspective scale ceases to work) or if the dimensions of the objects exceed the linear range of perspective grid then the profile length of the object can be determined by means of cuts along the perspective device made by traverses of extreme points of the object. Then from the line of passage of the airplane between two given traverses and the speed of the airplane it is possible to determine the distance covered by the airplane during the given time. The latter will correspond to the length of the measured side of the frozen object. In case the bearing of the airplane is at some angle to the course, the length of the ice object traversed (1) is given by airplane $l = S \cos \beta$, where S = true path of the airplane during period of passage of extreme point of ice object and β = angle of bearing of airplane; where the measured side of the iceberg is not parallel to course of the airplane but is at some angle to it then $l = S \cos \beta \sec \varphi$, where φ = angle between the true course of the airplane and the measured side of the iceberg; $S = vt$ (v—true path velocity and t—time) so that $l = vt \cos \beta \sec \varphi$. Also the method of measuring the height and distance of an iceberg is illustrated by means of a diagram and the appropriate formulas are developed. These are $h = a \operatorname{ctg} \psi$, where h = height of an iceberg, a = length of the shadow and ψ = angle of inclination of solar rays to the perpendicular, and $D = \mathrm{H} \operatorname{tg} \alpha$, where D = distance to the object in meters, H = height of the airplane in meters and α = vertical angle of sighting the object in degrees. *Subject Headings:* **1. Air-borne clinometers 2. Iceberg measurement instruments.**—*I.L.D.*

11.7–198 551.326.6:551.526.6

Lepotier, R., **La "patrouille des glaces."** ["Ice-patrol."] *Geographia*, Paris, No. 85:2–11, Oct. **1958.** 7 figs. **DLC**—The ice-patrol instituted after the shipwreck of the

"Titanic" in 1912, is commissioned to locate dangerous icebergs in order to notify their position to ships. Several attempts to explode icebergs are described. The author gives an ice terminology and supplies information about the spreading of sea ice and iceberg drifts according to season. *Subject Headings:* **1. Icebergs 2. Ice terminology 3. Sea surface temperature data.** —*A.V.*

11.7–199 551.556.8:551.326.7

Ono, Nobuo, **Effect of wind on very close pack ice.** *Low Temperature Science, Ser. A, Physical Sciences*, Sapporo, Japan, No. 18:171–178, **1959.** 7 figs., table, 4 refs. In Japanese; English summary p. 178. **DWB, DLC**—The Japanese Antarctic Research Expedition III was carried on with the "Soya" (ice strengthened patrol ship of the Maritime Safety Agency) between Nov. 12, 1958 and April 13, 1959. In Antarctica the "Soya" was caught in the very close pack ice on Jan. 14 (at 67°33′S, 40°27′E) and drifted till Feb. 1 (at 67°49′S, 37°18′E). The present writer participated in this Expedition in charge of oceanographic observations. The track of the "Soya" and the position of Ongul Island on which is located the Japanese wintering base "Showa" are shown in Fig. 1. Coefficients of wind-drift of ice were obtained from positions of the ship and data for the wind were observed on the ship at a height of about 17 m. Fig. 2 shows the tracks of the ship and of the wind. Coefficients of the winddrift are calculated from Fig. 1 and shown in Table 1. In spite of the fact that the drift angle was influenced by the coastal zone, the value of the coefficient of wind drift agreed with that of an area not influenced by coastal zone in the Arctic Ocean. Tracks of icebergs based on the positions observed by marine radar, are shown in Fig. 3. Icebergs were drifted like the drift of pack ice when the icebergs were in the very close pack ice. Moreover, Fig. 3 shows a small rotation of ice field which was considered to be influenced by the coast. Figs. 4 and 5 are pictures of icebergs. In Fig. 6A and B, polygons which combine the positions of icebergs show the contraction and relaxation. Deformations in all directions obtained from Fig. 6 are shown in Fig. 7A and B. In this figure, i.e., Fig. 7, ellipses show the change from circles in contraction and relaxation. *Subject Headings:* **1. Pack ice 2. Japanese Antarctic Research Expedition III 3. Wind effects on pack ice 4. Antarctica.**—*Author's abstract.*

11.7–200 551.46:551.326.14(268)

Browne, Irene M. (*AFCRC*), **Arctic Ocean research.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 15:20–22, April **1959.** 2 figs. **DWB**—Very brief note on the current research program including Project Ice Skate, and the drifting station Bravo (T-3). Seismic and resistivity techniques are applied to oceanic physics. Magnetic and gravity values are recorded daily along with ice movement and several other aspects of properties of the Arctic Ocean. *Subject Headings:* **1. Arctic Ocean research 2. Project Ice Skate 3. Drifting station Bravo (T-3) 4. Arctic.**—*W.N.*

11.7–201 551.326.1(99)

Herdman, H. F. P. (*Natl. Inst. of Oceanog.*), **Some notes on sea ice observed by Captain James Cook, R.N., during his circumnavigation of Antarctica, 1772–75 (Early discoverers, Pt. 12).** *Journal of Glaciology*, London, 3(26):534–541, Oct. **1959.** fig., 6 refs. English, French and German summaries p. 534. **DWB, DLC**—This paper is derived from notes on ice conditions made during a study of CAPT. JAMES COOK'S voyage around Antarctica in 1772–75. The original notes comprised a detailed examination of the day-to-day remarks on ice in COOK'S **Journal,** together with comments in the light of present-day knowledge. *Subject Headings:* **1. Antarctic sea ice 2. Cook's Journal 3. Antarctica.**—*Author's abstract.*

11.7–202 551.326.1/.6(99)

Korotkevich, E. S., **Ledovyĭ rezhim moria Deĭvisa.** [The ice regime of Davis Sea.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 91(2):152–155, March/April **1959.** 4 figs., 4 refs. **DWB, DLC**—The results of observations on the ice regime of Davis Sea and of adjoining areas between 80° and 100°E long. carried out during the first Soviet Antarctic expedition by aerial surveys are presented. The ice cover of Antarctica along the coasts is precipitous and attains a thickness of 10–30 m. Icebergs form continuously from the cover. The coastal part of the sea is dominated by negative temperatures almost throughout

the year. During the summer months (December–February) ice formation is rarely observed but in the remaining 9 months it proceeds continuously. During this time, especially in winter, easterly and southeasterly winds carry off ice formed along the coast in a northwest direction. The period with negative temperature decreases northwards; the winds become westerly and transport the ice eastward. The ice edge attains its maximum distance from the coast during August–October. Beginning in November it begins to retreat southward and during January–March it occupies its most southerly position. Ice formation along the outer edge of drifting ice begins in April when the ice begins to move northward. Ice formation begins in March along the coast when drift ice covers the western part of Davis Sea that was open in summer. Between the edge of the ice layer and the edge of the drifting ice large polyn'ya remain during the entire winter. In the formation of the continuous ice sheet snow plays an important role. When the salinity of the water in the coastal zone is 34.4%, ice formation begins at a temperature of −1.9°C. The annual variation in ice thickness (shown on a graph), the secular variation of the edge of drifting ice, etc. are discussed. *Subject Headings:* **1. Sea ice formation 2. Icebergs 3. Davis Sea.**—*I.L.D.*

11.7–203 551.326.7(480):656.61 551.582(480)

*Palosuo, Erkki, **Die Eisverhältnisse in den Finnland umgebenden Meeren im Winter 1955–56.** [Ice conditions in the neighboring seas of Finland in the winter of 1955–56.] *Finland. Merentutkimuslaitos, Julkaisu*, No. 174, **1957.** 14 p. 6 figs., 3 tables. **DWB, DLC**—Tables giving data on the time of appearance and of disappearance of ice and number of days with ice for 1955/56 and for the mean of 1934/1953, the ice and snow thickness in the winter of 1955/56 and navigations in the harbors during the winter of 1955/1956 (last ship, first ship, number of days on which navigation was interrupted), graphs showing the variation of air temperature in Helsinki during the winter of 1955/1956 and the general variation of the ice during the winter of 1955/56, and maps giving the ice situation on Dec. 23, Feb. 24 and March 23, and the location of the stations are presented. A descriptive text of the course of the winter is provided. *Subject Headings:* **1. Sea ice data 2. Finland.**—*I.L.D.*

11.7–204 551.326.7

Sawada, Teruo (*Hakodate Marine Obs.*), **On the damages brought about by sea-ice in 1956.** *Seppyo* (*Snow and Ice*), Tokyo, 18(3):94–104, Oct. **1956.** 7 figs., 13 tables. In Japanese; English summary p. 94. **DWB.** Also issued in: *Hakodate, Japan. Marine Observatory, Bulletin*, No. 5, (Contribution No. 16), Dec. **1958.**—The amount of sea ice on the coast of northeast Hokkaido in 1956 was greater than we had had for some years and considerable damage due to sea ice occurred everywhere. Coastwise fishery suffered the most damage because: 1) all fish boats were locked in the harbors for a long time and the catch diminished to nothing and 2) drift ice continually came near the fishing grounds and, until the latter part of April, numerous boats and nets were damaged by ice-floes. Consequently many packing and manufacturing plants were obliged to shut down for a long time. The total extent of damage was more than 3,000,000,000 yen. *Subject Headings:* **1. Sea ice damage 2. Drift ice 3. Sea ice conditions 4. Hokkaido, Japan.**—*From author's abstract.*

3. HYDROLOGY

11.7–205 551.579(02)

†Todd, David Keith (*Univ. Calif. Berkeley*), **Ground water hydrology.** New York, John Wiley, **1959.** 336 p. numerous figs., tables, eqs., refs. at end of each ch. Price: $10.75. **DLC** (GB1003.T56). Review by A. Nelson Sayre in *American Geophysical Union, Transactions*, 40(4):351, Dec. **1959.**—A technical type of text in the fundamental aspects of ground water hydrology, intended for civil engineers, geologists, agriculture and irrigation engineers, etc. requiring a background of mathematics through calculus and elementary geology. Much illustrative material is included from field investigations. The general and historical aspects are treated in Ch. 1, Ch. 2 deals with occurrence; Ch. 3 with movement; Ch. 4 with hydraulics; 5, with wells; 6, with levels and fluctuations; 7, quality; 8, development in basins; 9, surface investigations and exploration methods; 10, subsurface logging; 11, artificial recharge; 12, sea

water intrusion; 13, legal aspects and 14, model studies (sand, electrical, viscous fluid, membrane and numerical analysis models). Selected references are given on each subject. *Subject Headings:* **1. Ground water hydrology textbooks 2. Engineering hydrology.**—*M.R.*

11.7–206 551.579(02)

*†Wisler, C. O. and Brater, E. F. (*both, Hydraulic Eng., Univ. of Mich.*), **Hydrology.** 2d ed. New York, John Wiley and Sons, Inc., **1959.** 408 p. 136 figs., 34 tables, numerous foot refs., numerous eqs. **DWB** (M79 W814h)—Improvements have been made over the first (1949) edition, based on 10 years of classroom experience. Parts are condensed, parts are expanded and new material has been added (e.g., a new chapter on arid zones and one on snow by W. T. Wilson). The unit hydrograph method has been introduced as a procedure for determining the maximum flood in any race frequency. The 12 chapters cover: 1. definitions and history; 2. the hydrograph; 3. runoff producing factors; 4. precipitation; 5. infiltration and soil moisture; 6. ground water; 7. water losses; 8. runoff; 9. semi-arid regions; 10. snow; 11. floods and 12. stream flow records and measurement. Illustrations are almost entirely for the U. S. The text is well indexed and contains many excellent graphs, charts, nomograms, etc. *Subject Heading:* **1. Hydrology textbooks.**—*M.R.*

11.7–207 551.579(492)(08)

Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, **Verslagen technische bijeenkomsten 11–12 en Rapport inzake de lysimeters in Nederland.** [Proceedings of the technical meetings 11 and 12, and Report on the lysimeters in the Netherlands.] Its *Verslagen en Mededelingen*, No. 3, pub. 's-Gravenhage, **1958.** 259 p. figs., tables, eq. English and French summaries p. 229–259. (For report on Meetings 7–10, *see* 9.10–76, Oct. 1958, *Met. Abstracts.*) **DWB**—The 11th meeting, March 22, 1955, was devoted to the topic of water supply of sandy soils. The four papers read were:

1. **Water balance of high sandy soils,** by J. H. M. Latour and D. W. Stolp. In this paper the detailed analysis data from four catchment areas, 1948–1953, are discussed, including the water consumption for which the seasonal influence is shown in relation to precipitation.
2. **Effect of pumping for sprinkling purposes on the groundwater table in sandy areas,** by B. A. van Nes. Influence of adjacent lower field vegetation which depends on the ground water level is treated here.
3. **Rise of the phreatic surface and decrease in run-off by damming up a river,** by L. F. Ernst. Formulas enabling pertinent calculations and some conclusions to be drawn with regard to the total resistance, storage coefficient and the water balance are given.
4. **Water table regulation or sprinkling regulation,** by W. C. Visser. Water table regulation is most suitable to 50% of the Netherlands territory, sprinkling regulation to 20% but 30% requires further studies before determination.

The 12th meeting, May 30, 1956, dealt with quality requirements for surface waters and after a brief introduction by C. Bicmand the following six papers were read:

1. **Pollution by organic matter,** by J. J. Hopmans. Critical review of several methods. The dependability on pure mathematical procedure in biological process studies in surface water is slight. Some information on the oxygen content of the Rhine is given.
2. **Bacterial pollution,** by N. D. R. Schaafsma. Further pollution must be stopped. Danger of using contaminated water for crops and cattle is dealt with.
3. **Plankton,** by G. P. H. van Heusden. Total amount in Dutch waters is given. Plankton are a nuisance to industry, etc., and even fatal to cattle and fish.
4. **Salt content,** by C. van den Berg. The significance of the 300 milligrams per liter limit to the Dutch industry is discussed.
5. **Radiological activity,** by F. W. J. van Haaren. The problem is surveyed and discussed in terms of hazards, damages and counter measures.
6. **Risks,** by L. Huisman. The vital significance of reserve stock of fresh water for human and animal consumption, etc. is pointed out.

Finally, the 12 conclusions approved for presentation to the Chairman of the Commission for Hydrologic Research of TNO are listed. *Subject Headings:* **1. Hydrologic research 2. Netherlands.**—*W.N.*

11.7–208 551.506.1:551.579(569.4)(058)

*Israel. Hydrological Service, **Hydrological Yearbook of Israel, 1956/1957,** issued Jerusalem, **1958.** 276 p.+17 p. Text and introd. in English. Almost entirely tables. Legends in Hebrew and English. (For abstract on 1954/1955 and 1955/1956 issues, *see* 10.5–24, May 1959, *Met. Abstracts.*) **DLC, DWB**—This is the 12th in the series of hydrology yearbooks published under the guidance of M. GOLDSCHMIDT, founder and director of the Israel Hydrologic Service from its establishment up to his retirement in 1958. Elaborate graphic tables for Oct. 1956–Sept. 1957, presenting all hydrologic parameters for rivers, wadis, springs and wells (about 750 in all), are included. Elevation of water table, discharge, precipitation, % runoff relative to precipitation, chemical data (chlorinity), catchment area, and other data are also given. Long period averages for stream flow and precipitation, daily averages or values, and extremes are given for many stations. *Subject Headings:* **1. Hydrology yearbooks 2. Annual hydrological reports 3. Israel. I. Goldschmidt, M.**—*M.R.*

11.7–209 551.579.4(09)(44) 551.577.37

Deymié, Ph., **Exposé introductif sur les crues de la Cèze, des Gardons et du Vidourle des 30 septembre et 4 octobre 1958.** [Introductory discussion on the floods of the Cèze, Gardons and Vidourle on Sept. 30 and Oct. 4, 1958.] *La Houille Blanche*, Grenoble, Spec. No. A, 14:665–669, Sept./Oct. **1959. DLC.** Also in: *Société Hydrotechnique de France, Mémoires & Travaux*, No. 1:33–37, **1959.** tables, 3 refs., eqs. **DLC**—A review is presented of the heavy floods which occurred at Alès (France) from 1471 to 1958 and meteorological data (wind and precipitation) are given for the period Sept. 29–Oct. 5, 1958. The maximum rainfall reached 399 mm in 3 days, 243 mm in 1 day and 192 mm in 5 hrs. The maximum rainfall quantities were observed on the heights of the Cévennes basins, but at a certain distance from the slopes. *Subject Headings:* **1. Floods, France (1471–1958) 2. Historic floods 3. Rainfall intensities 4. Alès, France.**—*A.V.*

11.7–210 551.579.4(448)(234.2) 551.509.3:551.577.37

§Fontaine, P. and Portela, C., **Causes météorologiques des grandes crues Cévenoles du début de l'automne 1958.** [Meteorological causes of the severe Cévennes floods at the beginning of the autumn of 1958.] *La Météorologie*, Paris, Ser. 4, No. 53:25–43, Jan./March **1959.** 11 figs. French, English and Spanish summaries p. 25. **DWB**—The article presents a survey of the heights reached by the Cévennes rivers during the floods of the autumn of 1958 and a report of the recorded damage. It also gives the distribution and intensity of rainfall. The height of water recorded on Sept. 28 and 30 reached over 400 mm, on Oct. 3 and 4, heights up to 250 mm were recorded. The meteorological situations which caused the floods are analyzed. During this period the synoptic chart showed a deep Atlantic low centered from Iceland to Portugal and a high pressure zone over Central Europe and the Balkan States. This situation favored the arrival of cold polar maritime air masses from the SW. A detailed examination of the phenomena on a local scale reveals the different factors, the combination of which provoked the excessive rainfall. Consideration of these factors makes it possible to distinguish the situations which may bring moderate, heavy, very heavy or exceptional rainfall. The intensity of the rainfall provoked by this type of synoptic situation is dependent on: a) the blocking effect of a cold air dome over northern Italy and the French Alps; b) the cold Atlantic air mass; c) the warm air current from S. to S.W. corresponding to the warm sector and the occlusion of the perturbation. The authors assume that certain factors (e.g., the nature of the air masses) and also the synoptic situation may be predicted sufficiently in advance, whereas for other factors, only a very short range forecast is possible. *Subject Headings:* **1. Floods, Cévennes, France (Sept.–Oct. 1958) 2. Synoptic studies 3. Synoptic conditions for heavy rainfall 4. Rainfall intensities 5. Cévennes, France.**—*A.V.*

11.7–211 551.579.4:551.577.37(448)(234.2)

§Guillot, P., **Aspect hydrométéorologique des crues Cévenoles des 30 septembre et 4 ctobre 1958.** [The hydrometeorological aspects of the floods in the Cévennes on Sept. 30 nd Oct. 4, 1958.] *La Houille Blanche*, Grenoble, Spec: No. A, 14:682–691, Sept./Oct. **1959.** figs. **DLC.** Also in: *Société Hydrotechnique de France, Mémoires & Travaux*, No. 1:50–59, **959.** 7 figs. **DLC**—The rain which fell on Sept. 29 and 30, 1958, was heavy all over France ut became exceptionally intense on the southwest slopes of the Cévennes around midday on ept. 30. Rivers in the district rose from low water level to heights of many meters in a few ours, causing death and damage, especially in the Gard basin on the evening of Sept. 30. further catastrophe might have been expected as a result of fresh rainfall which took place our days later. Although not as severe as on Sept. 30, it caused particularly high specific ischarges on Oct. 4. Some of these figures have nevertheless to be treated with caution. his article analyzes the floods on the basis of data furnished by the E.D.F. river and rain age network and draws practical conclusions from this analysis. Charts show isohyets, elating to the rainfall quantities of Sept. 29 and Oct. 1, 1958 and from Oct. 3–10, 1958. The uthor presents the synoptic surface and 700 mb charts for Sept. 29 to Oct. 1. Analysis of ese charts shows that it is possible to forecast flood phenomena in these regions. *Subject eadings:* **1. Floods, Cévennes, France (Sept.–Oct. 1958) 2. Flood damage 3. Excessive ainfall 4. Cévennes, France.**—*A.V. and author's abstract.*

11.7–212 551.579.4:551.577.37(44)(234.2)

*Jacquet, J., **Les crues d'automne 1958 sur le Vidourle.** [The autumn 1958 floods on the idourle.] *La Houille Blanche*, Grenoble, Spec. No. A, 14:698–714, Sept./Oct. **1959.** 6 figs., charts, 2 photos, 3 tables. **DLC.** Also in *Société Hydrotechnique de France, Mémoires & ravaux*, No. 1:66–82, **1959.** 6 figs., 3 tables, 3 charts, 2 photos. **DLC**—An analysis is made the formation and development of floods on the Vidourle. Flood observations in 1958 ain and level recording gages) are presented. The author discusses the meteorological asons for the violence of the floods and effect on the floods of the position of the centers of the orms that caused them. Meteorological conditions (pressure, temperature and wind) lating to the floods in the Cévennes regions in Sept.–Oct. are given in tables and the isohyets the precipitations accumulated during the floods are shown on charts. The author studies e spatial distribution of the flood generating showers and analyzes intensities and duration the showers. He makes a comparison of the 1958 floods with record floods in the past tages and peak flows). A precipitation-discharge relation for the determination of peak ows by the unit hydrograph method is set up. The times of concentration and runoff per- ntages are investigated and the advantages of applying the unit hydrograph method to water urses of the Cévennes type are shown. *Subject Headings:* **1. Floods, Cévennes, France Sept.–Oct. 1958) 2. Rainfall distribution 3. Rainfall intensity-flood discharge relationships Cevénnes, France.**—*A.V.*

11.7–213 551.579.4:551.577.2:551.577.37(448)(234.2)

*Pardé, M. and de Beauregard, J., **Quelques remarques sur les crues Cévenoles de sep- mbre et octobre 1958.** [Remarks on the floods in the Cévennes in September and October 58.] *La Houille Blanche*, Grenoble, Spec. No. A, 14:670–681, Sept./Oct. **1959.** 2 charts, ables. **DLC.** Also in *Société Hydrotechnique de France, Mémoires & Travaux*, No. 1:38–49, **59.** tables, maps. **DLC**—The eastern edge of the Massif Central (Vivarais, Cévennes and ontagne Noire) and the tectonic foreland near the Rhone and the Mediterranean are fre- ently subjected to floods known as the "Cévennes" type, which are more sudden and heavier an almost anywhere else in France. They mainly occur during the first third of autumn. eir exceptional nature is due to the extremely intense rainfall which is very often in excess 100 mm per day to 200 mm in two days, with local records of as much as 500 to 1000 mm in hrs. A much more dangerous feature of these storms is that they often have very high aks lasting for one or two hours. For instance, rainfall amounting to 140 mm in 2 hrs s recorded on Sept. 30, 1958 at Alès and various other places. The unusually high dis- arge which characterizes the Cévennes type floods are caused by these very high rates of nfall which affect areas of up to hundreds or thousands of square kilometers. Examples of

recorded floods are: up to 30,000 liters/sec/km² for an area of 20 km² (Oct. 1860 near Clermont on the Hérault), 7000 to 8000 liters/sec/km² for an area of 361 km² (Sept. 30, 1958, the Cèze at Saint-Ambroix), 4500 liters/sec/km² for an area of 1080 km² (same day, the Gardon at Ners), 3200 to 3400 liters/sec/km² for an area of 1940 km² (Sept. 22, 1890, the Ardèche at Vallon). The typical and particularly savage flood on Sept. 30, 1958 was very impressive on the Ardèche, the Chassezac, the Gardon at Alès and on the upper Hérault. It exceeded almost legendary records on the Gardon at Anduze and everywhere on the lower as well as over most of the length of the Cèze and on the Beaume. It caused very heavy damage and 36 people lost their lives. A little later, on Oct. 4, the same rivers rose to levels very rarely encountered and the Vidourle rose above the maximum stage previously recorded at Sommières. *Subject Headings:* **1. Floods, Cévennes, France (Sept.–Oct. 1958) 2. Rainfall distribution 3. Rainfall intensities 4. Cévennes, France.**—*Authors' abstract.*

11.7–214 551.579.4(573)

Stotsenko, A. V., **Navodneniia v Primorskom krae.** [Floods in the Maritime Province.] (In: Akademiia Nauk SSSR. Dal'nevostochnyĭ Filial, Vladivostok. Institut Geografii. **Materialy po fizicheskoĭ geografii iuga Dal'nego Vostoka.** Moscow, Akademiia Nauk SSSR, **1958.** p. 254–272. fig., table, 8 refs.) **DWB** (551.4 A313ma)—Floods in the Maritime Province are a frequent phenomenon and have, in the past 10 yrs, resulted in average annual losses of 60 million rubles. While they occur on the average once in two years, some years may experience two or more floods. Principal causes are listed. The highly irregular terrain with steep slopes from mountains to river valleys, the dense network of meandering rivers, and the erratic seasonal distribution of precipitation are leading factors. Means for flood prevention or amelioration are discussed, with emphasis on the artificial alteration of the hydrological regime through such measures as the building of reservoirs. River stage and related statistics are given for selected floods (1932, 1938, 1943, 1946, 1950), and a complete list of all floods is given for the period 1877–1951, including data on months of occurrence (August and September predominate) and areas affected. *Subject Headings:* **1. Floods, Maritime Province 2. Maritime Province, U.S.S.R.**—*R. S. Quiroz.*

11.7–215 551.579:551.312.2(02)

*†Ivanov, Konstantin Evgen'evich, **Osnovy gidrologii bolot lesnoĭ zony i raschety vodnogo rezhima bolotnykh massivov.** [Principles of hydrology for swampy wooded areas and calculations of the water regime in marshes.] Leningrad. Gidrometeorologicheskoe Izdatel'stvo, **1957.** 499 p. 134 figs., 79 tables, 245 refs., 180 eqs. In appendix, figs. (some fold), 4 tables, 11 graphs. **DWB** (M79 I93os)—A large volume on the hydrology of bogs for use by students and technicians (hydrologists, engineers and bog specialists) emphasizing both theory and experimental results as applied to forecasting runoff from bogs as well as for determining their physical characteristics. The fact that bogs occupy an enormous portion of the land of the U.S.S.R. is emphasized and the history of bog research in Russia from 1923 to date is reviewed. The 5 major chapters deal with: 1) physical geographic characteristics of bogs; 2) hydrological characteristics of bogs; 3) hydrologic influences on bog morphology; 4) runoff from bogs (calculation forecasting, seasonal and long period factors) and 5) evaporation and water balance from and of bogs. Appended are 12 extensive tables of data, nomograms and coefficients for calculation and prediction, charts and diagrams as well as an extensive bibliography. Similar material is profusely scattered through the book. *Subject Headings:* **1. Bog science textbooks 2. Bog hydrology.**—*M.R.*

11.7–216 551.579.5:551.588.6

Richard, Felix (*Schweizerische Anstalt für das forstliche Versuchswesen*), **Über den Einfluss des Wasser- und Luftgehaltes im Boden auf das Wachstum von Fichtenkeimlingen.** [The influence of water-content and aeration in soil on the growth of spruce seedlings.] *Switzerland, Anstalt für das Forstliche Versuchswesen, Mitteilungen,* 35(1):243–264, **1959.** 7 figs., 8 tables, 22 refs. French, Italian and English summaries. **DLC**—An imperfectly aerated forest soil of the "Zugerberg III"—type was used in the experiment. The influence of structure improvement and drainage on root and shoot growth, respectively, are studied. Water content of the

soil is controlled by definite water tensions. Structure is characterized by determination of pore size distribution. Root development is only slightly influenced by increasing water-tension. It is assumed that this is due to the steep slope of the sorption curve in the range concerned. Structure change (i.e., increase in noncapillary pores) has a greater influence on the root growth. By calculating regression, significant correlation is found between soil aeration and root growth. Aeration has been measured by W. A. RAMEY's O_2-diffusion chambers. *Subject Headings:* **1. Forest hydrology 2. Forest soil moisture 3. Soil aeration effects on root growth.**—*Author's abstract.*

11.7–217 551.482(282.4)

Gazikalović, V., **Sliv Velike Morave.** [The Velika Morava River basin.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 6(1/2):64–69, Jan./June **1957.** fig. **DWB**—This is an areal survey of the various branches of the Morava River and individual sections thereof. Sizes of the watershed areas are shown on a map and in tabular form. Floods for the period 1946–1955 are listed. *Subject Headings:* **1. River basins 2. Velika Morava River, Yugoslavia.**—*G.T.*

11.7–218 551.579.4:551.509.58:551.482.6(522.4)

Imuta, S., **On the flood forecasting of the rivers in Miyazaki Prefecture.** *Journal of Meteorological Research*, Tokyo, 10(8):704, Aug. **1958.** table. In Japanese. **DLC**—The problem of the measurement of maximum runoff amount in a river basin is discussed, and the formula which was used for the probability of a maximum runoff amount is as follows:

$$Q\max(\mathrm{m^3/sec}) = 0.2778\, f r A$$

where f = flood coefficient, r = precipitation in a mean river basin (mm), A = area of river basin (km^2). Therefore, the probability of flood by the maximum runoff can be found as the maximum value of T hours rainfall obtained from the past precipitation statistics. *Subject Headings:* **1. Flood forecasting formulas 2. Miyazaki Prefecture, Japan.**—*K.C.*

11.7–219 551.579.5(789) 551.577(789)

*†Reeder, H. O. (*U. S. Geol. Survey*), **Ground water in Animas Valley, Hidalgo County, New Mexico.** *New Mexico. State Engineer Office, Technical Report*, No. 11, **1957.** 101 p. 39 figs., 5 tables, 30 refs., eqs.—A thorough study of the ground water levels in Animas Valley, N. Mex. (near or southwest of Lordsburg) showing successive lowering of water table from April 1948 to January 1955, amounting to about 25 ft at the lower points in the valley. Many charts and much data are included in the report. Previous work, geology, geography, drainage, climate (p. 7–9); effect of precipitation and pressure changes; data for 5 stations for 1948–55 (p. 21–24); temperature (p. 26), chemical analysis (p. 26), well characteristics, aquifer characteristics; use of water for irrigation, domestic and livestock; effects of pumping, seasonal and annual fluctuations and trends, etc. are discussed. Average annual precipitation is 10″ (July–September). *Subject Headings:* **1. Ground water surveys 2. Precipitation data, Animas Valley, N. Mex. 3. Water table lowering, New Mexico (1948–55) 4. Animas Valley, N. Mex.**—*M.R.*

11.7–220 551.579(498)

*Romania. Directia Generala Hidrometeorologica, **Scurgerea medie specifică a rîurilor din R.P.R.** [Specific mean runoff for rivers in Romania.] Sibiu, Tipografia "Reîntregirea," **1954.** 30 p. 6 figs., 6 charts (fold. at end), tables, 5 refs. (*Colectia "Lucrarile D.G.H.," Seria Hidrologie*, No. 1.) **DWB** (M79 R936se)—A brief monograph presenting methodology of calculating basin runoff and charts, maps and tables giving detailed data for Romania (normal runoff for period of record up to 1953) for 150 river gage stations. Map shows lines of mean runoff for entire country. *Subject Headings:* **1. Runoff data 2. River runoff data 3. Romania.**—*M.R.*

11.7–221 551.578.46(786,787)

*U. S. Soil Conservation Service, **Federal-State-private cooperative summary of snow survey measurements for Montana and northern Wyoming (Upper Missouri and Upper**

Columbia River Basins) 1922–1958 inclusive. Prepared by A. R. Codd. 2d ed. rev. Bozeman, Montana, Soil Conservation Service and Montana Agricultural Experiment Station, Sept. **1958.** 183 p. tables, maps. First ed., pub. 1953 under title: **Summary of snow survey measurements in Montana and northern Wyoming, 1922–1952 incl.,** also prepared by A. R. Codd. **DLC** (QC929.S7U473)—Minor revisions of data published in the 1953 edition resulted from complete rechecking of field notes. Snow survey courses are indexed by stream basins, and alphabetically for each of the two basins, and the data (snow depth and water content) by months for each year of record for each station. *Subject Headings:* **1. Snow survey data 2. Montana 3. Wyoming. I. Codd, Ashton R.**—*M.R.*

11.7–222 551.579(447) 551.509.318:551.579.4

Viers, G., **Hydrologie et climatologie de l'année 1957 dans les Pyrénées occidentales et centrales.** [Hydrology and climatology for the year 1957 in the western and central Pyrenees.] *Revue Géographique des Pyrénées et du Sud-Ouest,* Toulouse, 30(1):74–81, March **1959.** 3 tables, 8 refs. **DLC**—Comments relating to the yearly report of the Hydrological Center at Argelès-Gazost (High-Pyrenees). Taking as a basis the data of this yearly report, author discusses the origin of the floods in 1957 and gives a classification of their flow with regard to the meteorological conditions and geographical location. Some data are given relating to the maximum water amounts recorded at the snow and rain gages in the high mountains and to the snow depths measured in these regions. *Subject Headings:* **1. Hydrometeorology 2. Synoptic conditions for floods 3. Hautes-Pyréneés, France.**—*A.V.*

4. GLACIOLOGY

11.7–223 551.583.3:551.324.63(5-012)

Chemekov, Iu. F., **Chetvertichnye oledeneniia Dal'nego Vostoka.** [Quaternary glaciations in the Far East.] *Priroda,* Moscow, 7:86–89, July **1959.** fig. **DLC**—Vestiges of Quaternary glaciation discovered recently in various mountain regions of the Soviet Far East are described and discussed. One of the most important centers of their development, the Yam-Alin ridge rising to 1700–2300 m altitude, contains several hundred cirques and moraines. At present traces of Quaternary glaciation are known to exist in almost all important mountain ridges of the Far East, on the Kamchatka Peninsula, in China and in Japan. *Subject Headings:* **1. Quaternary glaciation 2. Far East.**—*A.M.P.*

11.7–224 551.324(481)

Ford, D. C. (*St. Edmund Hall, Oxford*), **Seilandsjøkulen and Nordmannsjøkulen, Finnmark, Norway.** *Journal of Glaciology,* Cambridge, 3(24):249–252, Oct. **1958.** 2 figs., ref. English and German summaries p. 249. **DWB, DLC**—The glaciers described are located on Seiland Island (lat. 70°30′N, 23°30′E), south of Hammerfest, Norway. The area of the glaciers in 1895–1896 is mapped for comparison with that of 1956 showing that the Seilandsjøkulen (981 m.a.s.) has shrunk totally by 56% and by northeast of its summit by 75%. The Nordmannsjøkulen is a 1072 m high mountain range which was nearly covered by ice in 1896. The present remains of residual ice masses no longer can be considered an icecap. Maintenance of the glaciers seems improbable due to lack of nourishment. *Subject Headings:* **1. Glacier retreat 2. Seiland Island, Norway.**—*W.N.*

11.7–225 551.321.5(235.1)

Klebelsberg, R. von, **Von der Vergletscherung des Kuh-i-Sawalan (4821 m), Nordwest-Persien.** [Glaciation of Kuh-i-Savalan (4821 m), northwest Iran.] *Zeitschrift für Gletscherkunde und Glazialgeologie,* Innsbruck, 4(1/2):119–120, **1958.** 4 photos. **DWB, DLC**—A group of German mountain climbers brought back some interesting photos which show the glacial conditions of this rarely visited mountain range. A clear picture of the snow penitents encountered at 5000 m.a.s. is included. *Subject Headings:* **1. Glaciological observations 2. Glacier photographs 3. Kuh-i-Savalan, Iran.**—*W.N.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Observers manuals,** 11.7–17; **Soviet ice floe stations,** 11.7–31; **Geophysical observatories** (Bukhnikashvili), 11.7–47; **Hergesell, "father of aerology"** (Weickmann), 11.7–61; **Agromet. stations** (Newman, Shaw), 11.7–92; **Phenological network obs.** (Chalupa), 11.7–95; **Meteor trail wind obs.** (Groves), 11.7–129; **Meteor echo obs.** (McNamara, McKinley), 11.7–131; **Meteor echo measurement** (Meeks, James), 11.7–132; **Radar obs. of auroras** (Schlobohm), 11.7–144; **Barometer corrections** (Vŭlev), 11.7–255; **Rainfall measurement** (Levert), 11.7–261; **Soil heat flux calculation** (Broĭdo, Suboch'), 11.7–296; **Soil heat conductivity calculation** (Broĭdo, Kozhar), 11.7–297; **Radio echoes from meteors** (Greenhow, Neufeld), 11.7–304; **Radioactive fallout pattern determination** (McCabe), 11.7–309; **Soil moisture measurement** (Szepesi), 11.7–367.

11.7–226 551.501:551.515.42

McDonald, James E. (*Univ. Ariz., Tucson*), **"It rained everywhere but here!"—The thunderstorm-encirclement illusion.** *Weatherwise*, Boston, 12(4):158–160; 174, Aug. **1959.** 2 figs. **DWB**—Farmers often exclaim that it rains on all sides of them but their own land goes unwetted. The comments constitute a mistaken description of what is really taking place. Through an example, it is pointed out, how this "thunderstorm-encirclement illusion" becomes an inevitable accompaniment of the summer time synoptic situations. The example has been illustrated by a hypothetical storm map showing locations of 50 thunder showers and 5 observers. The figure shows that each observer will see showers well distributed about the compass. To display this more vividly the azimuthal locations of all detectable storms have been read from this figure and plotted in the second figure. A situation is shown in which each observer would have good reason to assert that it was raining around him but it actually did not rain. The reason is that when airmass showers develop, people will be inclined toward hydrometeorological paranoia. The other explanation is the operation of simple probability theory which predicts that only about 8% of all observer-quadrants will be storm free which makes the encirclement illusion very common. *Subject Heading:* **1. Thunderstorm observation techniques.**—*I.S.*

11.7–227 551.501:551.524:551.551.25

Wanta, R. C. (*U. S. W. B. Res. Station, Cincinnati, Ohio*), **Representativeness of meteorological data in studies of air quality.** (abstract only) *Air Pollution Control Association, Proceedings*, Vol. 50, **1957.** Issued **1958?** Paper No. 8 (2 p.). 9 refs. **DWB** (M10.42 A298ap)—Meteorological data can be used to find answers to problems concerning the turbulent nature of atmospheric flow. This report shows the pertinence and application of meteorological measurements of various kinds of air quality from a standpoint of scale and representativeness. The paper recognizes the possibility of mapping in three dimensions the extensive and intensive network of temperature and wind in a 100 ft thick layer over a community. *Subject Headings:* **1. Weather effects on air pollution 2. Wind effects on air pollution 3. Urban air.**—*N.N.*

11.7–228 551.501:551.509:061.1

World Meteorological Organization, **Provisional guide to synoptic meteorological practices.** Geneva, **1959.** 41 p. figs. **DWB** (M01.6 W927pr)—The present provisional Guide, published in accordance with Resolution 18 of the Second World Meteorological Congress (1955), presents the decisions of the World Meteorological Organization on essential meteorological practices and procedures. Its provisional contents are divided into six chapters of which only three, Ch. I, II and V, appear in this guide. Chs. III, IV and VI will be included in the final edition of the Guide. In the present provisional Guide Ch. I deals with the preparation of synoptic meteorological charts. Both surface synoptic charts and upper air synoptic charts are mentioned and rules fixed by WMO governing the specifications for their base maps and the plotting of observations on these maps are discussed. Ch. II discusses the rules, adopted by WMO, concerning the representation of the result of the analysis on synoptic meteorological

charts by means of isopleths, fronts and various other symbols. Special code forms, developed and adopted by WMO to assist the meteorological services to exchange the results of the analysis in the form of meteorological reports are given in Ch. V. *Subject Headings:* **1. Synoptic chart preparation 2. International code manuals 3. WMO synoptic guides.**—*I.S.*

11.7–229 551.501.81:551.508.85

Decker, Fred W.; Pike, Julian M.; Fulmer, Allen L. et al., **Instrumentation and techniques for Army weather observation.** Oregon State College, Corvallis. Dept. of Physics, Contract DA-36-039 SC-73186, 3d Quarterly Technical Report, Sept. 1–Nov. 30, **1957.** 39 p. 3 figs., diagr., map, 3 tables, refs. at end of each section. Mimeo. (All articles abstracted separately.) **DWB** (M01 066i No. 3)—This research booklet contains various preliminary research reports on: the determination of storm intensity using radar; the precision tracking of storm cells and bands; weather effects on radio wave propagation; the electrification of storms; and the tactical possibilities of Hurricane "Audrey." Selected weather radar data are examined and a coordination of every possible kind of data on certain classical situations such as hurricanes, thunderstorms, wave cyclones, and frontal passages is suggested. *Subject Headings:* **1. Radar weather instrumentation 2. Radar storm detection.**—*N.N.*

11.7–230 551.501.1:551.594

Paramonov, N. A., **K voprosu unifikatsii atmosferno-elektricheskikh nabliudenii.** [The problem of the standardization of atmospheric electricity observations.] *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby. Komitet po Provedeniiu Mezhdunarodnogo Geofizicheskogo Goda, Informatsionnyĭ Sbornik*, No. 4:104–105, **1957.** **DWB**—It is suggested that condensers be situated at a standard height of 2 m above the ground and at a distance of 1.5 m from the walls of a building, which should not exceed one floor in height. In measuring potential gradient in a valley according to the method of NORINDER the basic standard of height for the upper condenser should be 2 m and the lower, 1 m. For points where potential gradient measurements have been carried out for a long time and the positions of the condensers do not correspond to the recommended standard, the transition to the new standard may be extended over a two-year period of comparative observations so as to determine a relationship between the new and old series, and thereby establish a coefficient for correcting the latter. *Subject Headings:* **1. Atmospheric electricity measurement 2. Instrument exposure.**—*I.L.D.*

11.7–231 551.501.1:551.508.822:37

U. S. Weather Bureau, **Training guide in rawin observations.** Prepared by Observations and Station Facilities Div. 3d ed. Its *Training Paper*, No. 7, July **1959.** 35 p. figs., tables. **DWB** (M01.1U587tr)—A summary of the rawin observations to be used for climatological purposes and the methods of obtaining wind directions and speeds for specific levels are discussed. These observations are evaluated for each minute from the surface to 7 km msl, and for each even-numbered minute at altitudes higher than 7 km msl. A list of Weather Bureau *Training Papers* is given to serve as a check guide. *Subject Heading:* **1. Rawin observation manuals.**—*N.N.*

11.7–232 551.501.3:551.553

Andreev, I. D., **Vybor optimal'nogo intervala osredneniia skorosti vetra.** [Selection of an optimum interval for determining wind speed averages.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 83:20–24, **1958.** fig., 2 tables, 2 refs., 5 eqs. **DWB, DLC**—The results of a study of the optimum period for determining wind speed average carried out in 1948 and 1949 at Koltushi, and in 1952 over the Gulf of Finland and semi-deserts in the region of Tashkent, showed that 10 min. is the optimum time interval. It is in conformity with the 10 min. period adopted by the World Meteorological Union (1947) and T. GRUNOV's paper **Repräsentative Zeitabschnitte zur Erfassung der Mittleren Windgeschwindigkeit** (1955). *Subject Heading:* **1. Wind speed averaging.**—*A.M.P.*

11.7–233 551 501.4:551 594.12

Roberts, C. A.; Sisco, W. B. and Fiskin, J. M., **Air composition below 3000 deg K.** *Space Aeronautics Research and Development Hand Book*, Vol. 3:D-19, 1959/1960, issued **1959.** table.

'Information taken from their **Equilibrium composition of air below 3000 deg K, including electron densities,"** in *Douglas Aircraft, Engineering Report,* LB-30078. **DWB**—Tables for determining electron density surrounding a space vehicle at temperatures of 1500, 2000, 2500 and 3000°K for concentrations of air of 1, 10^{-1}, 10^{-2} . . . 10^{-6} particles per air atom. These tables can be used for determining ion content and thus reflecting and propagating characteristics for electromagnetic waves. Data are given for particles of N_2, N, O_2, O, NO, NO^+, O_2^-, O-, e- and e^-/cm^3 for each temperature and each concentration. *Subject Headings:* **1. Electron density in exosphere 2. Atmospheric composition.**—*M.R.*

11.7–234 551.501.4:551.571 551.508.71

Troeger, H., **Die Ausdehnung des Hygrometer-Haares.** [Stretching of hygrometer hair.] *Meteorologische Rundschau,* Berlin, 11(6):187, Nov./Dec. **1958.** 4 refs. **DWB, DLC**—O. SONNTAG (*Zeitschrift f. Met.,* 8:314, **1954**) computed a new series for the stretching of the hair hygrometer for relative humidities; these values deviate up to 5% from the Biot—Gay-Lussac series. The values of SONNTAG can be expressed by the equation

$$A = 100\sqrt{U} - 30 \sin \varphi$$

where A = stretching of the hair in thousandths from 0 to 100%, U = relative humidity and φ = angle which is 90° for 50% and 180° for 100%. A table giving selected values for U, $100\sqrt{U}$, φ, 30 sin φ and A is presented. The equation gives good values for relative humidities of 40% and above but cannot be used if the deviations on the length alteration of the hygrometer hair has a maximum of 1%. *Subject Heading:* **1. Hair hygrometers.**—*I.L.D.*

11.7–235 551.501.5:551.577.36:551.577.22/32

Russak, S. L. and Easley, J. W. (*both, Martin Co., Baltimore*), **A practical method for estimating rainfall rate frequencies directly from climatic data.** *American Meteorological Society, Bulletin,* 39(9):469–472, Sept. **1958.** 5 figs., 3 refs. **DWB**—In evaluating the environmental limitations on microwave signal transmission, it was necessary to determine the occurrence of rainfall rates for a number of regions in different parts of the world. Clock-hourly precipitation data were used where available. Where these data were not available, a known empirical technique was employed which correlates clock-hourly rainfall at individual rates to a climatological index. This index uses parameters which are almost universally obtainable—namely, mean annual rainfall and number of days with measurable rain. In the course of this work, the authors found a more general relation between clock-hourly rainfall rate frequencies and the climatological index. Using this relation, rainfall frequencies at any rate are obtained directly from a linear equation and two nomograms. It is also possible to synthesize the complete frequency distribution of rainfall rates and obtain, as a check, the mean annual rainfall. Examples, supplemented by illustrations, are given in the development of this technique and its utilization. *Subject Headings:* **1. Rainfall intensity-frequency regime 2. Rainfall frequency determination.**—*Authors' abstract.*

11.7–236 551.501.721:535.243:551.521.14

Mironova, Z. F. and D'iachkova, T. V., **Spektrofotometricheskiĭ metod izmereniia al'bedo estestvennykh podstilaiushchikh poverkhnosteĭ.** [Spectrophotometric method of measuring the albedo of natural surfaces.] *Leningrad. Universitet. Uchenye Zapiski,* No. 22:89–92, **1957.** English summary p. 91. 4 figs., 11 refs. (subseries *Ser. Fiziki i Khimii,* No. 4). **DLC** (AS262.L422)—Methods of measuring the spectral albedo of natural surfaces are described. Preliminary data are given on the spectral albedo of green and dry grass, wheat fields, black fallow and snow surface at wave lengths from 0.4 to 0.8μ. *Subject Headings:* **1. Albedo measurement 2. Spectrophotometric study of light reflection.**—*Authors' abstract.*

11.7–237 551.501.724 551.501.771 551.508:621.315

*Kucherov, N. V., **Ustanovka dlia izmereniia gradientov temperatury i vlazhnosti vozdukha.** [Device for measuring air temperature and humidity gradients.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* 77:57–64, **1958.** 8 figs. (incl. photos), 4 tables. **DWB, DLC**—The author describes the construction and operation of two devices for measuring tem-

perature and humidity at a distance. One is designed for measurements over the surface of water and the other on a television mast. The device for telemeasurement of temperature and moisture gradients at 0.5 and 2.0 in. over water and land surfaces consists of 3 thermocouples and one resistance thermometer. The thermocouples were made of copper and constantan wires, the ends of which were inserted in series into a galvanometer. The resistance thermometer was made of copper wires capable of measuring with an accuracy of ±0.1°C. Both thermocouples and resistance thermometer were placed in a psychrometer for mercury thermometers. Aspiration was carried out by means of an electric motor with constant current. The construction of the telepsychrometer is described with the aid of an illustration and diagrams. The results of measurements of temperature and humidity on Lake Sevan are presented in tables. The telemeasurement installation on a television mast consisted of an electrical aspirator situated at 24, 96 and 180 m above the earth's surface. Measurements were made with a Wheatstone bridge according to the null method. Data in the form of tables and graphs are presented on the diurnal variation of temperature and humidity at the different heights at Kiev during August–Sept. 1957. A temperature inversion occurred at 22 h; it gradually increased and reached its maximum at 6–7 h. At 8–9 h it weakened sharply and from 10–11 h a superadiabatic temperature gradient became established. *Subject Headings:* **1. Thermocouples 2. Temperature gradient measurement techniques 3. Humidity gradient measurement techniques 4. Telemetering systems 5. Telemetering psychrometers.**—*I.L.D.*

11.7–238 551.501.75:551.557

Panenka, Ivan, **Opredelenie skorosti vetra na poverkhnostiakh so znacheniem 300 mb, 200 mb, 100 mb i v tropopauze na osnovanii dannykh o skorosti vetra na poverkhnosti 500 mb.** [Determination of wind velocity at 300 mb, 200 mb, 100 mb levels and in the tropopause from velocity data at 500 mb level.] *Studia Geophysica et Geodaetica*, Prague, 3(3):288–291, **1959.** 3 figs., 2 tables, 3 refs. English summary p. 291. **DWB**—The correlation coefficients between the wind velocities are given for the different levels and a method is proposed for determining the wind velocity in higher levels from wind velocity data in the 500 mb level by means of regression lines. The values given are valid for the southwest synoptic situation. *Subject Heading:* **1. Upper air wind computation.**—*Author's abstract.*

11.7–239 551.501.75 551.551.21:551.553.6

Salamonik, S. (*PHIM—Warsaw*), **Widmo czestotliwości w ruchach turbulencyjnych powietrza.** [Frequency spectrum of atmospheric turbulence.] *Przegląd Geofizyczny*, Warsaw, 4(1):57–64, **1959.** 7 figs., 3 tables. English summary p. 64. **DWB, DLC**—In investigating spectral turbulence structure, a relatively sensitive anemograph of the Aerological Institute at Legionowo was used which operates by means of selsyns with mechanical recording of wind velocity and direction. Forty-six diurnal records from various months of 1953, 1954 and 1955 were evaluated. Different months were chosen as turbulence development is dependent not only on the hour of the day but also on the season of the year. Diagr. 1 shows the frequency distribution of the time ranges of wind velocity fluctuations. They are marked on the abscissas, the number of n of cases in which they occurred, on the ordinates. From this diagram it appears that there are four time ranges in wind velocity fluctuations: $T_1 < 15$ min; $T_2 = 20$–40 min; $T_3 = 1$–2 hrs; $T_4 = 4$–5 hrs. Period T_2 is caused by thermal turbulence, whereas periods T_3 and T_4 are the effect of "low" and "high" velocity fields of different size. Diagr. 7 presents a frequency distribution of fluctuations of wind direction, based on analysis of 12 records of wind direction. The form of this curve indicates that in a turbulence current of air, the following periods of wind velocity fluctuation may be distinguished: $T_1 < 24$ min; $T_2 = 24$–48 min; $T_3 = 1$–2 hrs; $T_4 = 2^h15^m$–2^h30^m. *Subject Headings:* **1. Atmospheric turbulence 2. Turbulence spectra.**—*Author's abstract.*

11.7–240 551.501.9

†Fujita, Tetsuya; Brown, Henry A. and Omoto, Yukio, **Design of a three-dimensional meso-meteorological network.** Chicago. Univ. Dept. of Meteorology, Contract DA-36-039-Sc-78901, First Quarterly Technical Report, April 1–June 30, **1959.** 40 p. 38 figs., 22 refs. **DWB** (M(051) C532qu)—The mesometeorology group at the University of Chicago has undertaken to study the capabilities of existing and pre-existing networks for serving as frameworks

for mesometeorological studies, and to design a network best suited for the solution of mesometeorological problems involving three-dimensional space and time. The present report shows the status of the research at the end of the quarter. It examines and studies previous and existing networks and the types of data collected. Investigations of five case studies have been made, utilizing data from four different observation networks. A separate section at the end contains numerous graphical illustrations representing the data. The networks evaluated are: a) Ohio Thunderstorm Network; b) Japanese Thunderstorm Network; c) Muskingum Soil Conservation Service Network, and d) New Jersey Microbarograph Network. A summary of knowledge gained from previous studies concerning various mesoscale systems is included. An account of the evaluation and three-dimensional structure of some of these systems conclude the report. *Subject Heading:* **1. Mesometeorological networks.**—*I.S.*

11.7–241 551.501.9:551.594

Israël, H., **Verzeichnis der luftelektrisch arbeitenden Stationen.** [List of atmospheric electricity stations.] (In: Israël, H. (*ed.*), **Luftelektrizität im A.G.I.: Bericht über die Tagung in Aachen am 11.–12. Mai 1956.** pub. Aachen, **1957.** p. 111–114. Forms, 2 foot-refs. German and English summaries plus list of stations. **DWB?**—H. Mason's proposal to establish an index of all stations, as presented by the author, met with approval. The preparatory step includes the preparation of a questionnaire with the following items: (1) Geographical lat. and long., (2) Elevation, (3) Orographic situation, (4) Particulars on antenna arrangement, (5) Brief description of local climate, (6) Statement on sources and incidence of disturbances in the vicinity, (7) Magnitudes measured or recorded, (8) Brief statement on measuring methods and instrumentation, (9) Regularity of operation, (10) Date of beginning of operation, (11) Name and address of head of the station or organization. A list of the presently known stations is presented. *Subject Heading:* **1. Atmospheric electricity station registers.**—*W.N.*

OBSERVATIONAL DATA

See also: **IGY ionosphere program** (Mitra), 11.7–25; **IGY program** (Popov), 11.7–26; **IGY research,** 11.7–27; **Soviet participation in IGY** (Routledge), 11.7–28; **Arctic exped.** (Joensen), 11.7–32; **Soviet participation in IGY,** 11.7–35; **Forest phenology** (Chalupa), 11.7–95; **Forest phenology** (Koelmeyer), 11.7 96; **Hydrol. yearbooks,** 11.7–208; **Hurricane statistics, N. Atlantic** (Cry et al.), 11.7–283.

11.7–242 551.506:551.521.1(714)

***Radiation solaire, Septembre 1958 à Février 1959.** [Solar radiation, September 1958 to February 1959.] *Bulletin de Géophysique*, Montreal, No. 5:38, April **1959. DWB**—Daily values of direct and diffuse global solar radiation at Montreal are tabulated. The daily average in Sept. 1958 was 279 cal/cm², in Oct. 201, in Nov. 117, in Dec. 100 and in Jan. 1959, 111 cal/cm². A similar tabulation appears in each issue of the *Bulletin*. *Subject Headings:* **1. Global radiation data 2. Montreal, Quebec.**

11.7–243 551.506.1:551.582.2(435.9)

*Luxembourg. Service Météorologique et Hydrographique, **Annuaire Météorologique et Hydrographique** [Meteorological and Hydrographical Yearbook], **1953–1958.** Issued **1954–1959.** 7 pieces (annual). About 160 p. each. Almost entirely tables. (For abstract on 1951 issue, *see* 3.7–47, July 1952, *Met. Abstracts.*) **DWB**—Daily climatological data (air temperature, atmospheric pressure, relative humidity, clouds, wind, precipitation, sunshine) for the meteorological stations of Luxembourg, Echternach and Clervaux. Monthly climatological data of the different stations of the Grand Duchy of Luxembourg. Daily average soil temperatures at various depths. Daily depths of precipitation, water-level and flow at different stations of the basins of the Sûre, Alzette, Meuse, Moselle, etc. *Subject Headings:* **1. Annual meteorological data summaries 2. Yearbooks 3. Soil temperature data 4. Luxembourg.**—*A.V.*

11.7–244 551.506.1(058)(410,411,415,420(:550.38(058)

***Observatories' Yearbook, 1945, 1946, 1947, and 1948. Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the Lerwick,**

Aberdeen, Eskadalemuir, and Kew Observatories. All issued London, Her Majesty's Stationery Office, **1959–1960.** Also: . . . **1957–1958,** issued **1960.** 8 vol. Each about 130 p. Almost entirely tables. Vols. for 1951–1956 not issued yet. (For abstract on 1938 Yearbook issued 1955, *see* 7.9–79, Sept. 1956; for issues 1939–1944, *see* 10.8–14, Aug. 1959, *MAB.*) **DLC**—As a result of suspension of publication of the Observatories' Yearbook during 1939–45, these and subsequent yearbooks have been delayed. The 1938 Yearbook was published in 1955, the 1939 in 1956, 1940, 1941 and 1943 in 1958; and the 1944, 1945, 1947 and 1948 volumes are published in 1959. The 1947 volume gives magnetic, potential gradient and auroral data for Lerwick (60°8′N, 1°11′W); meteorological data for Aberdeen (57°10′N, 2°W); meteorological, electric, and magnetic data for Eskadalemuir (55°19′N, 30°12′W), and meteorological, atmospheric, electric and pollution data for Kew (51°28′N, 0°19′W). Hourly, daily, monthly, seasonal and annual means, extremes, anomalies, etc. are given for most elements. The 1948 volume contains geomagnetic, atmospheric electricity and auroral data for Lerwick; meteorological, geomagnetic and electric data for Eskadalemuir; and meteorological, electric and atmospheric pollution data for Kew. Daily solar radiation data are given for Kew for 1947 and 1948. Ground temperatures at 30 and 122 cm, and grass minimum temperatures are given for Aberdeen, Eskadalemuir and Kew for 1947 and at the two latter stations for 1948. *Subject Headings:* **1. Annual meteorological data summaries 2. Observational data 3. Geomagnetic yearbooks 4. Solar radiation data 5. Soil temperature data 6. Kew, Eng. 7. Lerwick, Scotland 8. Aberdeen, Scotland 9. Eskadalemuir, Scotland.**—*M.R.*

11.7–245 551.506.1(44)

Le printempts 1959 en France. [Spring 1959 in France.] *La Nature*, Paris, No. 3292: 345, Aug. **1959. DLC**—Short report on the weather evolution in France during the 3 spring months of 1959. Seasonal mean temperature in spring was above normal; rainfall was excessive for most of the regions, with a maximum in the southwest. Precipitation showed a deficit in the east central, in the north and in the Paris basin. *Subject Headings:* **1. Monthly climatic anomalies 2. France.**—*A.V.*

11.7–246 551.506.1(689)

Review of the 1958–1959 rainy season. *Rhodesia Agricultural Journal*, Salisbury, 56(3):109–112, May/June **1959**—Brief review of the weather from October through April, 1958–1959 in the northern and southern regions of Rhodesia and Nyasaland. *Subject Headings:* **1. Monthly climatic anomalies 2. Rhodesia 3. Nyasaland.**—*A.V.*

11.7–247 551.506.1:551.582.2(494.4)

*Ruche, J., **Résumé météorologique de l'année 1958 pour Genève.** [Meteorological summary of the year 1958 at Geneva.] *Geneva. Observatoire, Publications, Ser. M*, No. 33, **1959.** 13 p., 3 figs., tables.—Principal characteristics of the weather at Geneva during the year 1958. Monthly, seasonal and yearly climatological data (average and extreme values) relating to temperature, precipitation, sunshine duration, wind regime, thunderstorms, fogs, etc. The daily values of the principal climatic elements are tabulated for the different months of the year. *Subject Headings:* **1. Annual climatological data summaries 2. Geneva, Switzerland.**—*A.V.*

INSTRUMENT CARRIERS

See also: **Air-borne radiation measurement** (Garrigue), 11.7–114; **Sec. D6,** p. 1056; **Airplane obs. of atmos. elec.** (Sagalyn), 11.7–395.

11.7–248 551.507.2:551.508.824:551.326.7:551.465

Iakovlev, V. I., **Analiticheskiĭ sposob obrabotki dannykh pelengovaniia dreĭfuiushchikh avtomaticheskikh radiometeorologicheskikh stantsii.** [Analytical method of processing data on the bearings of drifting automatic radio meteorological stations.] *Meteorologiia i Gidrologiia*, Leningrad, No. 7:41–42, July **1959.** fig., ref., eq. **DWB, DLC**—Operation of the automatic radar on the "DARMC," drifting automatic radio meteorological station, developed by ALEKSEEV of the Arctic Institute are briefly described with graphical illustration. The installation is used for study of ice drifts and sea currents. Automatic radio signals sent at

regular intervals are received by different shore stations. Instant location is analytically determined with observed bearings and direction of large circle passing through the receiving station. By this means, computation of the coordinates can be made with good accuracy and during comparatively short time. *Subject Headings:* **1. Drift ice meteorological stations 2. Automatic weather stations.**—*N.P.S.*

11.7–249 551.507.321:551.510.53:551.594.13

Kroening, John L. (*School of Physics, Univ. Minnesota*), **Ion-density measurements in the stratosphere.** *Journal of Geophysical Research*, Wash., D. C., 65(1):145–151, Jan. **1960.** 8 figs., 10 refs. **DWB, DLC**—The number density of small negative ions in the atmosphere was measured in 1958 on a series of eight balloon flights which reached altitudes of 115,000 ft over Minneapolis (45°N). A pronounced decrease in the number density of small negative ions was observed at the tropopause on seven of the eight flights, and similar decreases were observed at numerous temperature inversions in the stratosphere. The results strongly suggest the presence and bunching of 'dust' above the temperature inversions. In the absence of dust and ionizing agents other than cosmic rays, the number density of negative ions increases with altitude to 50,000 ft, where a maximum of approximately 5500 ions/cm³ occurs. Above this altitude the number density decreases to a value near 2000 ions/cm³ at 115,000 ft; this result is contrary to the almost constant value expected in the stratosphere from cosmic-ray data and the Thomson theory. *Subject Headings:* **1. Balloon flight observations 2. Ion density measurement techniques.**—*Author's abstract.*

11.7–250 551.507.352:551.515.2:551.553

Jordan, C. L. (*Florida State Univ.*) and Fortner, Limon E., Jr. (*Maxwell A. F. Base, Ala.*), **Estimation of surface wind speeds in tropical cyclones.** *American Meteorological Society, Bulletin*, 41(1):9–13, Jan. **1960.** fig., table, 8 refs. **DWB**—The surface wind-speed reports in tropical cyclones given by aircraft-reconnaissance observers are based almost exclusively on state-of-sea observations. The reliability of wind estimates prepared in this manner is considered along with some of the practical difficulties involved in making observations from reconnaissance aircraft. *Subject Headings:* **1. Aircraft weather reconnaissance 2. Wind speed estimation.**—*Authors' abstract.*

INSTRUMENTS

See also: **Nuclear radiation detectors** (Sharpe, Taylor), 11.7–118; **Cosmic ray instruments** (Conversi et al.), 11.7–137; **Photoelectric nuclei counters** (Hoppe), 11.7–138; **Submarine light measurement instruments** (Sasaki et al.), 11.7–189; **Radar weather instrumentation** (Decker et al.), 11.7–229; **Rawin obs. manuals,** 11.7–231; **Hair hygrometers** (Troeger), 11.7–234; **Telemetering systems** (Kucherov), 11.7–237; **Automatic weather stations** (Iakovlev), 11.7–248; **Sonic anemometers** (Panofsky), 11.7–331; **Water vapor measurement, using radiosonde data** (Wilson), 11.7–337.

11.7–251 551.508.21

Goisa, N. I., **Ustanovka dlia polevykh i ekspeditsionnykh aktinometricheskikh nabliudenii.** [Equipment for field and expeditionary actinometric observations.] *Meteorologiia i Gidrologiia*, Leningrad, 6:49–51, June **1959.** fig. **DWB, DLC**—The author describes with the aid of a diagram a field actinometric installation which takes into account the best aspects of the Berezina and Ianishevskiĭ apparatus. It is separable and consists of three fundamental parts, viz: a vertical bar, a horizontal arrow and two mutually perpendicular welded sockets with a cable for the actinometer. The height of the vertical bar varied with that of the crop. The screen is set up with the aid of special collars which enable the apparatus to be sheltered under special conditions. A four-ply cable, 250–280 cm long, is fastened to the arrow. One end is fastened to the apparatus, the other, together with the conductors from the actinometer, enters into a six pole transformer. Two galvanometers of the GSA-1 type are used for measurement; one is joined directly to the actinometer and the other by a switch to the other instruments. During observations the arrow is fixed by a turn around the bar in the direction toward the sun and is then held fast. This excludes the influence of the azimuth since the instruments will be oriented in relation to the sun always in the same direction. The displace-

ment of the vertical socket up and down regulates the height of the apparatus above the underlying surface. For shading, the instruments are pulled to the bar and the arrow is moved over its entire length. In this manner the shaded instruments are at a distance of 1.5 m from the bar over the section with the undisturbed condition of the underlying surface. Such installations have been used in the Ukrainian Hydrometeorological Institute since 1957. *Subject Heading:* **1. Actinometers.**—*I.L.D.*

11.7–252 551.508.26:535.214

Rudomanski, Andrew C., **Experimental study for a free air thermometer.** Barnes Engineering Co., Stamford, Conn., Contract Noa(s) 57-636-c, Final Report, April 1, 1957–March 31, **1958.** (original unchecked. paging not given) illus. (ASTIA AD-202-423)—A laboratory prototype instrument was developed for the measurement of free air temperatures by the application of IR radiometric techniques. An IR detector which is sensitive to only the spectral region defined by atmospheric CO_2 at 14.6μ was fabricated. The detector is a laminate consisting of a sensitizing material (powdered talc) deposited on a gold reflector which is in contact with a thermally sensitive layer. A wideband interference-type filter which consists of multilayer Te and rock salt vacuum deposited on an NaCl substrate was employed to eliminate the strong unwanted talc band at 10μ. The spurious response still remaining after the band pass filter was combined with the sensitized talc detector was removed by coating the filter substrate with polyvinyl butyral. The assembly was perfectly matched to the 14.6μ CO_2 band and was substantially devoid of any spurious response. The polyvinyl butyral coating also provided a moisture-impervious barrier for the NaCl surface. The calibration curve obtained with pure CO_2 was substantially linear at gas temperatures from 5° to 50°C. *Subject Headings:* **1. Thermometers 2. Temperature instruments 3. Temperature measurement techniques.**—*TAB abstract.*

11.7–253 551.508.29:621.355

Aleksandrov, V. S., **Pribor dlia izmereniia temperatury.** [Instrument for temperature measurement.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 83.40–42, **1958.** 2 figs. **DWB, DLC**—The author describes an apparatus intended for the measurement of temperature in the range from −45°C to +45°C. The electric power of the device is supplied by 4–5 dry flashlight batteries with 15–18 volts which is adequate for 20 hrs continuous operation. *Subject Headings:* **1. Temperature measurement techniques 2. Temperature instruments 3. Thermometers.**—*A.M.P.*

11.7–254 551.508.41

Dynametrics Corporation, Burlington, Mass., **Digital barometer.** *Review of Scientific Instruments*, N. Y., 29(9):804, Sept. **1958. DLC**—The Dynametric Corp. manufactures the Model PT103 barometer which is a null-balancing electromechanical constant calibration instrument providing 5 place readings and corrected for local gravity conditions. The moment beam loses equilibrium when pressure is applied to either of two mercury reservoirs. A sensitive electrical pickup signals a servomotor which repositions a poise weight within the beam to restore equilibrium. *Subject Heading:* **1. Mercurial barometers.**—*W.N.*

11.7–255 551.508.41:551.501.42

Vŭlev, M., **Zhivachnite barometri v meteorologichnata mrezha i tekhnite instrumentalni popravki.** [Mercury barometers in the meteorological network and their correction.] *Khidrologiia i Meteorologiia*, Sofia, No. 3:86–88, **1959.** table. **DLC**—Mercury barometers used in the Bulgarian meteorological network are discussed with particular attention to their correction factors. A table is presented on barometers used at 52 stations, containing the following information: name of station, type of barometer, old correction factor, barometer used for verification, date of verification, new correction factor, and elevation above sea level. *Subject Headings:* **1. Mercurial barometers 2. Barometer corrections.**—*G.T.*

11.7–256 551.508.531/.54:621.315

Sarazhskiĭ, D. Ia., **Anemorumbometr na sel'sinakh.** [A selsyn anemometer.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Gidrometeorologicheskogo Priborostroeniia, Trudy*, No. 5:149–

155, 1957. 7 figs., ref. **DLC, DWB**—With the aid of photographs and diagrams, the author describes the construction characteristics and underlying principles of an anemometer capable of measuring simultaneously mean wind velocity and wind direction at some distance from the installation of the apparatus. The measurement involves the inductional self-synchronizing transmission of an alternating current that consists of two electrically connected and similar non-contact selsyns. The installation consists of an anemometer and direction meter attached to a metal mast. The velocity meter consists of three hemispherical conical cups turned to one side. The axis of the system is united to the selsyn unit by means of a reducer with a transmission ratio of 5:300:1. The direction recorder consists of a double bladed wind vane whose axis is directly attached to the rotor of the selsyn direction meter. An alternating current motor provides automatically a 2 to 10 sec measurement of mean wind velocity and direction. Wind velocities of 1 to 40 m/sec can be measured. Wind direction is measured with an accuracy of $\pm 5°$. The accuracy of wind velocity measurement is $\pm(0.5 \text{ m/sec} + 0.5\ V)$ where V = mean wind velocity. A graph of a test of the device in a wind tunnel is presented. *Subject Headings:* **1. Recording anemometers 2. Selsyn anemometer 3. Wind measurement instruments.**—*I.L.D.*

11.7–257 551.508.56

Karmin, Irving (*New York Univ.*), **Adapting a theodolite to semi-automatic operation.** *American Meteorological Society, Bulletin*, 39(9):473–475, Sept. **1958.** 3 photos. **DWB**—A pair of the theodolites have been successfully adapted to semi-automatic operation by means of a camera and timing source. A possible reduction in manpower with an increase in accuracy has resulted. Double theodolite observations have been made using the semi-automatic theodolites and a radio link between theodolites. The film strips provide a permanent record of each run and can be conveniently stored for reference. Semi-automatic operation of the camera, and in particular the Robot, permits recording of the theodolite positions during small intervals of time, an operation which is limited when using human recorders. *Subject Heading:* **1. Theodolites.**—*Author's summary.*

11.7–258 551.508.57

Lugeon, Jean and Rieker, Jean, **Comparaison entre le radiogoniographe à secteur étroit et le radiogonimètre à rayon cathodique.** [Comparison between the radiogoniograph and the cathode ray radiogoniometer.] *Schweizerische Naturforschende Gesellschaft, Geneva, Verhandlungen*, 138:106–107, **1958.** fig., 3 foot-refs. **DLC** (Q67.S4)—The diagrams obtained by the narrow sector radiogoniograph compared with the photographs of the cathode ray goniometer are shown, demonstrating that the two methods complement each other in registering azimuths. The radiogoniometer of the Institut Suisse de Météorologie is described with the improvements made by the authors. The techniques for comparing the two registrations of azimuthal directions are also explained. *Subject Headings:* **1. Radiogoniographs 2. Radiogoniometers.**—*O.T.*

11.7–259 551.508.59:551.508.29:551.596.1

Businger, J. A., **Sonic anemometer-thermometer observations, Hancock, Wisc. 1957.** Wisconsin Univ. Dept. of Meteorology, Contract AF 19(604)-1384, Final Report, Aug. 31, **1958.** p. 57–61. 2 tables, 3 refs. **DWB**—During August and September of 1957 experiments with the sonic anemometer-thermometer were carried out near Hancock, Wisc. at the Agricultural Station of the University of Wisconsin. The site was chosen because a complete instrumentation for measuring the heat budget was available. The purpose of the experiment was: a) to obtain experience in working with the sonic anemometers, and b) to obtain simultaneous observations of various related quantities of interest in the study of turbulence with vertical wind component at two heights and the vertical wind component and the temperature at the same place. Observations made during the experiment are tabulated (Tables 1, 2), for 6 runs with the sonic anemometer. These were the only observations, out of 20 runs that were of sufficient quality to be reduced. In Table 1 a survey of the runs is given and Table 2 gives the variance and cross-spectra. *Subject Headings:* **1. Sonic anemometers 2. Turbulence instrumentation.**—*I.S.*

11.7–260 551.508.762

Sartor, Eugene E. and Wilson, Frank, **Cloud-height set AN/FMQ-3( ).** *U. S. Signal Corps Engineering Laboratories, Ft. Monmouth, N. J., Test Report,* No. T-1388, March 30, **1956.** 25 p. numerous figs. and photos, 2 refs. **DWB**—Elaborate tests on component parts of rotating beam ceilometer developed by Crouse-Hinds Co., Syracuse, N. Y., and Times Facsimile Corp., New York, are reported and the equipment, circuits, records under various conditions, etc. are illustrated. The equipment was considered acceptable (providing minor modifications were made) for production. *Subject Headings:* **1. Ceilometers 2. Cloud height indicators 3. Instrument testing reports.**—*M. R.*

11.7–261 551.501.777:551.508.77

Levert, C., **Het doel van metingen met scheef opgestelde regenmeters.** [The purpose of measurements with inclined rain gages.] *Hemel en Dampkring,* The Hague, 57(7/8):172–177, July/Aug. **1959.** 3 photos, table. **DWB, DLC**—The article gives a method for measurements of obliquely falling rain, with inclined rain gages. At least three rain gages are required, but the simpliest formulas are obtained with four equally inclined rain gages (here 20°) forming a quadrangle with S-N and E-W axes.

(1) $$H_1+H_2=H_3+H_4 \text{ and } H_1+H_2=2H_0 \sin 70°$$

(2) $$tg\gamma=\frac{tg\ 70}{H_1+H_2}\sqrt{(H_1-H_2)^2+(H_3-H_4)^2}$$

(3) $$tg\Psi=\frac{\sqrt{(H_1-H_2)^2+(H_3-H_4)^2}}{2H_0\cos 70}$$

(4) $$db_v=H_0/OD$$

where: H_0 = the total quantity of water in gr gathered in the usual rain gage during the individual rain; γ = the angle between the vertical and the path of the drops, taken on the average of the whole rain; Ψ = the azimuth or angle between the vertical plane through the drop-path and the vertical plane from N to S; bv = vertical fall speed of the drops; d = density of water per cm^3 air above the rain gage during rain; D = duration of rainfall in min; O = receiving surface of the rain gage in cm^2. Ten cases are treated in which H_0 varies between 0.8 and 18 mm. *Subject Headings:* **1. Rain gages 2. Rainfall measurement techniques.**—*A. V.*

11.7–262 551.508.822

Rossi, Veikko, **A new Finnish radiosonde, a radiosonde provided with thermostat.** *Finland. Ilmatieteellinen Keskuslaitos, Toimituksia,* No. 43, **1957.** 22 p. 6 figs. (incl. photo), 4 tables, 17 refs., eqs. **DWB, DLC**—The new Finnish radiosonde is provided with a relatively light thermostat whose heat capacity is placed in a double-walled container which accomodates in its interior the barometric element and other requisite devices. The part that carries the thermometer and the hygrometer is detachable. Details of the design of the new model and its operation as well as the characteristics of its receiver and the evaluation of results are discussed and illustrated, with photos, calibration curves, diagrams, etc. The use of the Finnish radiosonde for meteorological elements is based on the comparison of the capacities of the barometer, thermometer, and hygrometer condensers with those of two constant condensers described in this communication. *Subject Heading:* **1. Radiosondes.**—*N. N.*

11.7–263 551.508.85

Rockney, Vaughn D. (*U. S. W. B., Wash., D. C.*), **The WSR-57 radar.** *Weather Radar Conference, 7th Miami Beach, Florida, Nov. 17–20, 1958, Proceedings,* issued **1958.** Sec. F:14–20. 6 figs. **DWB** (M01.81 R124pc, 1958.)—This is a new radar of which the Raytheon Manufacturing Co. of Waltham, Mass., will deliver 31 sets to the U. S. Weather Bureau and 8 sets to the U. S. Navy. The military designation is AN/FPS 14. The description includes a feature of particular interest for meteorological use: one of the two independently operated IF amplifiers has linear response characteristics, the other logarithmic. The console and the

photo repeater can be operated on either one or on the same amplifier simultaneously. The advantage is obvious. *Subject Heading:* **1. Radar equipment.**—*W.N.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Trajectory forecasting manuals,** 11.7–14; **Weather message manuals,** 11.7–15, 11.7–16; **Synoptic conditions for heavy rainfall, Cévennes, France** (Fontaine, Portela), 11.7–210; **Flood forecasting, Miyazaki Prefecture** (Imuta), 11.7–218; **Synoptic conditions for floods, Hautes-Pyrénées** (Viers), 11.7–222; **Synoptic chart preparation,** 11.7–228; **Single station data specification,** 11.7–327; **Special bibliog. on Forecast Verification,** p. 1129.

11.7–264 551.509.31

†§Illinois. State Water Survey. Meteorologic Lab. at Illinois Univ., **Mesometeorological analysis of atmospheric phenomena.** Contract DA-36-039-Sc-64656, Quarterly Technical Reports, No. 1–11, Aug. 1, 1955–Jan. 31, **1958.** (10 to 15 p. each). figs., tables, refs. Also: Final Report, May 1, 1955–May 31, 1958. Issued **1958.** 107 p. 137 figs., 144 refs. **DWB** (M(055) I29m)—The purpose of the research reported in these reports was to study the behavior of the atmosphere on a scale of less than 100 mi by conducting detailed synoptic and upper air analyses. Twenty-eight synoptic case studies were mesoanalyzed using 1947 Thunderstorm Project data. The Fujita method of surface analysis was used. Seven classifications of mesosystems are made: thunderstorm high, mesolow, mesocyclone, pressure jump, pressure surge, mesotrough, and depression-type wave. There were also disturbances in the wind, temperature and moisture fields which did not affect the pressure field. It is found that squall lines produce cellular pressure rises and cold fronts produce lines of pressure rises. A study of wind fluctuations reveals the movement of small scale circulation across the network. A new network especially designed for the study of mesometeorological phenomena is recommended. This network should telemeter data to a centralized digital recording system. *Subject Headings:* **1. Mesoanalysis 2. Thunderstorm analysis 3. Stationary front analysis.** —*Authors' abstract.*

11.7–265 551.509.32:551.582.2/.3

*Ped', D. A. and Turketti, Z. L., **Uchet klimatologicheskikh dannykh pri otsenke prognozov pogody.** [Consideration of climatological data in evaluating weather forecasts.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:40–43, May **1959.** fig., 2 tables, 6 refs. **DWB, DLC**—The authors propose a method for selecting materials for making 3–7 day temperature forecasts and for setting up tolerances for evaluating the forecast on the basis of precipitation and air temperature. In establishing criteria for evaluating these meteorological elements it is necessary to consider the territorial distribution of the elements and their dependence upon season. The determination of precipitation tolerances is based upon the use of data on days with and without rain per month in the U.S.S.R. available in handbooks. On the basis of these data, regions with less than 10 days of rain, less than 10–20 days of rain and more than 20 days of rain per month were mapped. The class with less than 10–20 days per month was most frequent and that with more than 20 days per month was least frequent. Each of these groups has its own tolerances in evaluating precipitation forecasts and these are illustrated by means of graphs. In obtaining temperature tolerances for 3–7 day forecasts the variability of daily mean temperature along a 5-day moving average is used. Maps of variability of mean daily temperature by month for the U.S.S.R. were constructed on the basis of these data. In view of the considerable regional variability as illustrated by the data in a table, the magnitude of the tolerance is 0.75 of the mean long period variability of atmospheric temperature. Then not the standard interval of 5°C will be indicated in forecasts of air temperature but the characteristic interval for the appropriate season and region. *Subject Headings:* **1. Temperature forecasting 2. Forecast evaluation 3. Climatological forecasting 4. U.S.S.R.** —*I.L.D.*

11.7–266 551.509.5:629.13

Kuo, W. S., **D-value properties and its application to aeronautical meteorology.** *Meteorological Bulletin*, Taipei, Formosa, China, 5(1):22–25, **1959.** 5 figs., table, 6 refs., eqs.

In Chinese; English summary p. 22. **DLC**—Due to rapid improvement of the aircraft industry the aircraft reports in which meteorological elements are included are very important and useful in the field of aeronautical meteorology. Among these elements the topic of D-value is discussed in this paper, which consists of two parts: (1) Theoretical—by hypsometric equation with brief practical examples for studying various cases of D-value change and (2) Practical—by methods for direct application of D-value from aircraft to significant constant pressure level chart for increasing upper air data and the use of D chart. *Subject Headings:* **1. Aeronautical meteorology 2. Pilot reports.**—*Author's abstract.*

11.7–267 551.509.5:551.552:521.542

Summers, P. W., **Relation between the surface wind at Wigram and the mean sea level pressure distribution.** *New Zealand. Meteorological Service, Technical Note*, No. 116. Sept. 6, **1954.** 5 p. 2 figs. **DWB**—The pattern of surface wind flow at Wigram is studied by means of three-hourly synoptic reports for the months June–Aug. 1952. The surface wind is related to the mean sea level pressure differences between Hokitika and Wigram and between Kelburn and Taieri. An attempt is made to formulate tentative rules for forecasting the surface wind direction on the basis of these pressure differences. *Subject Headings:* **1. Objective wind forecasting 2. Surface wind forecasts 3. Sea level pressure distribution 4. Wigram, New Zealand.**—*Author's abstract.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

ATMOSPHERIC COMPOSITION

11.7–268 551.510.41:546.22

Junge, C. E. (*GRD, AF Camb, Res. Center, Bedford, Mass.*), **Sulfur in the atmosphere.** *Journal of Geophysical Research*, Wash., D. C., 65(1):227–237, Jan. **1960.** 3 figs., 8 tables, 13 refs. **DWB, DLC.** Summary in *Geofisica Pura e Applicata*, Milan, 42:49, **1959.**—In unpolluted areas sulfur occurs primarily in three compounds, $SO_4^=$ in aerosols and SO_2 and H_2S as gas. Sources of $SO_4^=$ are the ocean, the soil, and the oxidation of the gaseous compounds. A considerable fraction of the SO_2 is of anthropogenic origin. As measurements in polluted and unpolluted areas indicate, most of the H_2S seems to be natural. In unpolluted air in the northeastern part of the United States, both gases have approximately equal concentrations. The chemistry of the conversion of these gases to $SO_4^=$ is discussed. Estimates of the sulfur budget of the global atmosphere, excluding the $SO_4^=$ in sea salt particles, indicate that 30% is of anthropogenic origin. Measurements of the chemical composition of Greenland ice back to the year 1915 are presented. The measurements show that the concentration of $SO_4^=$ is much higher than that of other soluble constituents, but it has not increased since 1915 as much as one would expect if it were of industrial origin. It is concluded that industrial sulfur is removed from the atmosphere before it spreads to polar regions. This is consistent with estimates of the residence time of about 5 days for SO_2 and about 40 days for total sulfur. Convay showed that more SO_2 enters the oceans with river water than can be accounted for by the weathering of rocks and sediments on land and that the excess must come from the atmosphere. He assumes a closed sulfur cycle and suggests that this sulfur must return to the atmosphere as H_2S, produced in the shelf areas of the oceans. In view of the considerable amounts of industrial sulfur, it is possible that the global sulfur cycle is not closed and that most of the excess sulfur in river waters is of anthropogenic origin and will stay in the ocean. *Subject Headings:* **1. Atmospheric composition 2. Sulphur.**—*Author's abstract.*

ATMOSPHERIC POLLUTION

See also: **Air pollution handbooks** (Magill et al.), 11.7–19; **Atmos. pollution effects on eyes** (Iorish), 11.7–104; **Radioactive pollution of atmosphere** (Garrigue), 11.7–114; **Stack effluent diffusion** (Morton), 11.7–303; **Dust prevention** (Rossing), 11.7–336.

11.7–269 551.510.42:551.593.55

Bigg, E. K. (*C.S.I.R.O., Radiophysics Lab., Sydney, Aust.*), **Twilight detection of aerosol layers.** *Indian Journal of Meteorology and Geophysics*, Delhi, 10(2):185–188, April **1959.**

g., 3 refs. **DWB, DLC**—The technique of using the differential light-intensity method for tecting aerosol layers in the atmosphere is described. Later two of MEGRELISHVIH's (1958) nclusions concerning the effective height and resolving power are discussed. It is concluded at MEGRELISHVIH's conclusions are true for short wave lengths or observations near the nith but they are not correct for the technique actually used. *Subject Headings:* **1. Aerosol tection 2. Twilight observation of aerosol layers.**—*I.S.*

11.7–270 551.510.42(443.611)

Un danger mortel. La pollution de l'air. [A deadly danger: air pollution.] *Revue de thologie Générale*, Paris, 59(704):99–102, Jan. **1959** and 59(706):369–372, March **1959. A,DNLM**—Atmospheric pollution of air in large towns increases from day to day and actually comes a serious threat. The alarming increase in the number of lung cancer cases constitutes very important problem. This article draws up a comprehensive study on the precise data ncerning this widespread problem. The author classifies the main pollution sources in ree categories: industrial furnaces, domestic heating and motor vehicles. These various llution types are successively examined and some features of atmospheric pollution in Paris e quoted. Seventy-two thousand tons of dust fall on Paris in the course of one year; 150 illions of particles are suspended within every cubic meter of air in the French capital. ar traffic in Paris represents more than 500 tons of combustion residue. Air sampling in aris had led to the detection of from 88,000 to 170,000 bacteria per cm^3. Effects on the ganism by this pollution are disastrous: acceleration of breathing, premature tiredness of art, interception of atmospheric luminosity and ultraviolet radiation which contributes to merous cases of rachitis by children. Lungs are very sensitive to the polluted condition the atmospheric state. Lung cancer has increased by 42% in the last five years in the Paris gion. The author deals with the action taken to reduce atmospheric pollution and mentions e resolutions adopted at the 4th Congress of the International Society. *Subject Headings:* **Atmospheric pollution 2. Paris, France.**—*A.V.*

11.7–271 551.510.42:551.594.12:612.014.4

Dussert-Bergerac, A., **L'air pur et l'ionisation.** [Pure air and ionization.] *Revue de thologie Générale*, Paris, 59(708):659–663, May **1959. DA, DNLM**—Short survey of the culiar meteorological conditions likely to raise the concentration of atmospheric pollution d examination of the causes which bring about sudden or progressive electric changes in e atmosphere. The author investigates the consequential effects of ionization increase on the man organism. *Subject Headings:* **1. Atmospheric pollution 2. Ionization effects on human ganisms.**—*A.V.*

11.7–272 551.510.42:551.555.8

El-Fandy, M. Gamal Eldin, **On the physics of dusty atmospheres.** *Institut Fouad I du ésert, Heliopolis, Egypt, Bulletin*, 1(2):90–94, Jan. **1951.** 2 tables, 2 figs., 7 refs. **DLC**—his is a more descriptive treatment of the subject than that contained in the author's paper blished in the *R.M.S., Quarterly Journal*, April **1953** (*see item* 4.9–71, Sept. 1953, *Met. bstracts*) under the same title. The sources, types of material, size distribution, critical wind eeds, frequency of dust storms in relation to wind speed (data from Burgel-Arab, western gypt, 1941–1945), development of dust storms (stability and instability types), counting of spended dust (using Owen's dust counter) and, finally, the action of dust on solar and ter-strial radiation of various wave lengths are treated. *Subject Headings:* **1. Dust 2. Dust orms 3. Egypt.**—*M.R.*

STRUCTURE OF THE ATMOSPHERE

See: **Stability** (Galin), 11.7–273.

UPPER ATMOSPHERE—IONOSPHERE

See: **Sec. D2,** p. 1048.

RADIO METEOROLOGY

See: **Radio wave propagation** (Keary), 11.7–37.

RADIOACTIVITY

See: **Sec. B6,** p. 1041.

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Coriolis effects on tides and currents** (Biesel), 11.7–181; **Thermal stratification effects on turbulent diffusion** (Inoue), 11.7 295; **Pressure effects on convergence and divergence** (Zubov), 11.7–298; **Turbulence structure** (Businger et al.), 11.7–301; **Turbulent diffusion effects on elec. field** (Large, Wormell), 11.7–394.

11.7–273 551.511:551.510.

Galin, M. B., **Ob ustoĭchivosti atmosfernykh dvizheniĭ planetarnogo masshtaba.** [Sta bility of atmospheric movements on a planetary scale.] *Akademiia Nauk SSSR, Izvestiia Ser. Geofiz.*, No. 4:570–580, April **1959.** 10 figs., 11 refs., 14 eqs. Russian summary p. 57 **DLC**—The stability of movement of the atmosphere is investigated on the basis of a tw level model upon a sphere. The dependence of conditions of stability and also of differen characteristics of movement upon the differences of the indices of circulation at selected leve is examined. On the basis of the theory presented, a forecast of a pressure field is mad *Subject Headings:* **1. Stability 2. Atmospheric models.**—*Transl. of author's abstract.*

11.7–274 551.511:551.513.1:551.558.21:551.4

Kurbatkin, G. P., **Uchet negeostrofichnosti v prostranstvennoĭ zadache obtekaniia go** [Calculation of the nongeostrophic elements in flow around mountains.] *Akademiia Nau SSSR, Izvestiia, Ser. Geofiz.*, No. 4:581–592, April **1959.** 20 figs., 4 tables, 10 refs., 14 eq Russian summary p. 581. **DLC**—The problem of the flow of air around large mountains examined in a rectangular system of coordinates (i.e., without considering the sphericity of th earth). The movement is regarded as stationary and adiabatic and the atmosphere is com pressed and baroclinic. The linear problem is solved by the method of long waves. Th conditions of quasigeostrophicity are not superimposed and the initial system of equations solved rigidly. This provides an explanation of the influence of the hypothesis of quas geostrophicity. The limiting conditions on the surface of the earth are so set up as to conserv the effects of both flowing over and around mountains. An example of calculations and comparison with the quasigeostrophic method are presented. *Subject Headings:* **1. Nonge strophic wind flow 2. Air flow around obstacles 3. Orographic effects on atmospher circulation.**—*I.L.D.*

11.7–275 551.511.33:551.52

Kondrat'ev, K. Ia. and Senderikhina, I. L., **O priblizhennykh uravneniiakh perenos radiatsii.** [Approximate equations of radiation transfer.] *Akademiia Nauk SSSR, Izvestii Ser. Geofiz.*, No. 5:725–731, **1959.** 3 figs., 3 tables, 7 refs., 18 eqs. **DWB, DLC**—The mo often used approximate equations for radiation transfer involve the substitution of exa integral-differential equations for radiation intensity by ordinary approximate differenti equations for descending and ascending radiation flux. The equations of transfer for ascendi (F_1) and descending (F_2) radiation flux are

$$\frac{1}{\rho}\frac{dF_1}{dz} = 2kB - m_1(k+\sigma\Gamma_1)F_1 + m_2\sigma\Gamma_2 F_2$$

$$\frac{1}{\rho}\frac{dF_2}{dz} = -2kB - m_1\sigma\Gamma_1 F_1 + m_2(k+\sigma\Gamma_2)F_2.$$

The problem of using these equations is reduced to clarifying the problem regarding the d pendence of coefficients m_1 and m_2 on the nature of the angular distribution of the intensi of radiation and of Γ_1 and Γ_2 not only upon the intensity of radiation but also on the form

he scattering index. The variability of the coefficients m_1, m_2, Γ_1 and Γ_2 is investigated with reference to the transfer of short wave (scattered, total) radiation in the atmosphere. The oefficients m_1 and m_2 represent mean ascents of zenithal distance determining the direction of the "center of gravity" radiation. They are computed on the basis of the angular distribution of energy intensities of scattered and reflected radiation obtained in Leningrad oblast nd in the Crimea. The equation for m_2 is given by

$$m_2 = \frac{S' \sec \theta\odot + D \cdot m_D}{S' + D}$$

where S' and D = flux of direct solar and scattered radiation on a horizontal surface respectively; $\theta\odot$ = zenithal distance of the sun; m_D = coefficient for scattered radiation. The coefficient m_1 s given by $m_1 = a \sec \theta\odot + b$ and coefficient m_D is given by $m_D = a' \sec \theta\odot + b'$. The formulas or Γ_1 and Γ_2 are presented, namely

$$\Gamma_1 = \frac{1}{2} - \frac{\frac{1}{4}p}{m_1(1+\frac{1}{3}q)}$$

nd

$$\Gamma_2 = \frac{1}{2} - \frac{\frac{1}{4}p}{m_2(1+\frac{1}{3}q)}$$

where p and q are parameters indices. Values of m_D and Γ_1 and Γ_2 are presented in tables. It is shown that the approximate treatment of the equations of transfer of radiant energy as ordinary differential equations leads to large errors. The approximate treatment is not a sufficiently reliable method for calculating the radiational flux of short wave radiation in the atmosphere. *Subject Headings:* **1. Radiative transfer 2. Radiation flux.**—*I.L.D.*

11.7–276 551.511.6:551.551.21

Hay, J. S. and Pasquill, F. (*both, Met. Office and Chem. Defence Exp. Estab., Porton, Eng.*), **Diffusion from a continuous source in relation to the spectrum and scale of turbulence.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 345–365. 5 figs., 3 tables, 14 refs., 7 eqs.—Recent observations of the crosswind spread of particles at 100 m from a continuous ground-level source are analyzed assuming that the Lagrangian and Eulerian correlograms have similar shapes, but different "scales" (ratio β:1). This leads to a simple method of deriving the turbulent spread of particles directly from wind fluctuation records. The implied values of β have considerable scatter, but an average of four, independent of wind speed and stability, is suggested. Previous U.K. and recent U. S. results on diffusion over a few hundreds of meters provide further support. Data on wind tunnel diffusion and the spread of geostrophic trajectories indicate that β is insensitive to scale. Similarity in the power law indices representing the dependence of spread on distance over very different ranges is a coincidence due to these ranges being proportional to the Lagrangian scales. *Subject Headings:* **1. Turbulence spectra 2. Turbulence scale 3. Diffusion.**—*Authors' abstract.*

11.7–277 551.511.6:551.551:551.511.13

Hinze, J. O. (*Laboratorium voor Aero-en Hydrodynamica der Technische Hogeschool, Delft*), **The effect of compressibility on the turbulent transport of heat in a stably stratified atmosphere.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 229–234. 9 refs., 17 eqs. **DWB, DLC**—Starting from the energy equation for the steady state, showing the separate effects of the mean motions and the turbulent motion, an equation is derived in which the contribution to the transport of heat by turbulence is expressed in terms of the mean-temperature and mean-pressure distribution, and a second-order eddy-diffusion tensor. This equation clearly shows the well-known fact that a transport of heat by turbulence may occur directed up the temperature gradient if the mean-temperature distribution deviates from the adiabatic one. *Subject Heading:* **1. Turbulent transfer of heat.**—*Author's abstract.*

11.7–278 551.511.6:532.13:532.59

Kitaĭgorodskiĭ, S. A., **K teorii turbulentnoĭ viazkosti v volnovom dvizhenii.** [Theory of turbulent viscosity in wave motion.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:773–777, **1959.** 2 figs., 15 refs., 29 eqs. **DWB, DLC**—The author develops a series of expressions for determining turbulent viscosity which enters into the equation for measuring the mean energy dissipated during a wave period. The coefficient of turbulent viscosity, V_{turb}, can be expressed by the equation $V_{\text{turb}}=l^2(du/dz)$, where l=mixing path of Prandtl. The coefficient of integral turbulent viscosity V_{turb} is given by $\bar{V}_{\text{turb}}=(h\lambda/T)\psi(\delta)$ where h, λ, and T=height, length and period of the wave, respectively and δ=curvature of the wave. It is also given by the equation $\bar{V}_{\text{turb}}=k\delta^{\alpha}\beta^{3}(W^3/g)$, where W=wind velocity, $\beta=c/W$ where $c=\lambda/T$ and $k=2\pi n$. If $\delta=f(\beta)$ then $\bar{V}_{\text{turb}}=k(W^3/g)\varphi(\beta)$. The determination of $\varphi(\beta)$ and the dependence of wave curvature δ on β and the value of α are discussed and the determination of α is carried out on the basis of a number of hypotheses concerning the scale of turbulence in the expression $V_{\text{turb}}=l^2(du/dz)$. These hypotheses are $l\sim h$ or $l\sim he^{-kz}$; $l\sim\lambda$ and $l\sim h+z$. *Subject Headings:* **1. Turbulent viscosity 2. Wave motion.**—*I.L.D.*

11.7–279 551.511.6:533

Krzywoblocki, M. Z. v. (*Univ. of Ill.*), **On turbulence in rarefied gases.** *U. S. National Congress of Applied Mechanics, 2d, Univ. of Michigan, Ann Arbor, June 1954, Proceedings*, pub. **1955.** p. 677–685. 8 refs., numerous eqs. **DLC** (TA5.U52)—GRAD's representation of eqations of motion, continuity and energy is used to describe turbulent vector field of a flow in the realm of rarefied gases. The method of space Fourier spectrum is applied to show that the field variables (velocity, density, pressure and temperature fields) separate into a few distinct groups: one corresponding to eddy turbulence, the other associated with fluctuating acoustical waves, etc. From that standpoint the result is analogous to that one obtained by previous authors using simplified Napier-Stokes equations. Derivation of equations of motion for spectral tensors closes the paper. *Subject Headings:* **1. Turbulence in rarefied gases 2. Gas mechanics.**—*Author's abstract.*

GENERAL CIRCULATION

See: **Wind and temp. in Arctic stratosphere** (Wexler, Moreland), 11.7–29; **Arctic air circulation,** 11.7–33; **Atmos. circulation-atmos. pollution relationships** (Kopcewicz), 11.7–115; **Orographic effects on atmos. circulation** (Kurbatkin), 11.7–274.

ATMOSPHERIC DISTURBANCES

See also: **Frontal effects on mortality** (Kuhnke), 11.7–101; **Air mass effects on lung embolism** (Sandritter et al.), 11.7–103; **Thunderstorm obs.** (McDonald), 11.7–226; **Wind speed in tropical cyclones** (Jordan), 11.7–250; **Pressure changes during cold air invasions** (Čadež), 11.7–299; **Typhoon precip.** (Jordan, Shiroma), 11.7–354; **Orographic effects on cyclogenesis and pressure fields, Skagerrak** (Barg), 11.7–387.

11.7–280 532:551.515.11

Josephson, Julian, **Sur la structure des tourbillons électroconvectifs.** [The structure of electroconvective vortices.] *Académie des Sciences, Paris, Comptes Rendus*, 249(8):876–877, Aug. 24, **1959.** ref. **DWB, DLC**—Experimental study on the structure of the electro-convective vortices in order to explain the almost rotary motion of liquid particles about their axes. The author describes the various experiments which proved that the rotation of the particles of a cell around its axis results from the effect of an interaction between the electric and magnetic fields. Indeed, as soon as a certain ratio between the intensity I of the electric field and the force H of the magnetic field is reached, the little fluid column conveying electric current oscillates rotationally about its axis with constant amplitude Ω and frequency f. The optimum effect is obtained when the components E and H are perpendicular to each other. This structure of electro-convective vortices could furnish a logical explanation for the forming of cyclones and waterspouts. *Subject Headings:* **1. Fluid mechanics 2. Electroconvective vortices 3. Cyclone formation.**—*A.V.*

11.7–281 551.515.2(729.5)

Colon, Jose A., **Meteorological conditions over Puerto Rico during hurricane Betsy, 1956.** *Monthly Weather Review*, Wash., D. C., 87(2):69–80, Feb. **1959.** 19 figs., table, 7 refs. **DWB, DLC**—The observations of wind, pressure, rainfall, and radar bands recorded over Puerto Rico during the passage of Hurricane Betsy are presented and discussed. The track of the hurricane across the Atlantic and eastern Caribbean Sea, which shows an apparent sinusoidal oscillation around the mean path, is also included. The radar observations are used to obtain the detailed path of the hurricane across Puerto Rico and to study the changes in the structure of the precipitation bands that resulted from the passage over the mountainous section. Photographs are presented to illustrate the variations in the radar structure. Some inferences are made in regard to the changes in the intensity of the wind and pressure fields. It is shown that some weakening of the wind field and filling of the central pressure occurred with motion over the land area, and that rapid deepening followed as soon as the hurricane moved over water on the north side of the island. The rainfall observations are compared with those recorded in the great "San Felipe" hurricane of September 13, 1928. *Subject Headings:* **1. Hurricane "Betsy" (1956) 2. Radar observation of hurricanes 3. Puerto Rico.**—*Author's abstract.*

11.7–282 551.515.23:551.588.1:551.41(52)

Arakawa, H., **Coast effect on typhoon movement.** *Papers in Meteorology and Geophysics*, Tokyo, 9(3/4):123–126, Jan. **1959.** 5 figs., ref. Japanese summary p. 126. **DWB**—There seems to exist a remarkable coast effect on typhoon movement. Sometimes hurricanes are seen to advance parallel to the coast along Cape Hatteras. Similarly, a more marked coast effect on typhoon movement can be seen along the coast of Kwanto District (Greater Tokyo Area) in Japan. A simple dynamic explanation of this effect is offered. *Subject Headings:* **1. Typhoon movement 2. Coastal configuration effects on typhoon movement 3. Japan.**—*Author's abstract.*

11.7–283 551.515.23:551.506.3(261)

*Cry, George W.; Haggard, William H., and White, Hugh S., **North Atlantic tropical cyclones. Tracks and frequencies of hurricanes and tropical storms 1886–1958.** *U. S. Weather Bureau, Technical Paper*, No. 36, **1959.** 214 p. 3 figs., 191 charts, 5 tables, 12 refs. **DWB**—Data from several sources were combined to obtain definitive tracks of all tropical storms (wind 39 to 73 mph) and hurricanes (winds 74 mph or higher). These are shown in 3 series of charts arranged as follows: trajectories for each year, 1886–1958; for each 10-day period, the years 1886–1958 combined; and for each 10-day period by 10-year periods. Twenty-four-hour positions of storm centers are shown prior to 1931,1 2-hour positions thereafter; storm, hurricane, and (in the later years) extratropical and dissipation stages are distinguished along the trajectories. Bar graphs give the overall annual frequencies of storms and hurricanes, and also of those whose centers crossed the U. S. coastline, classified by sections of the country affected. The long-period average number of occurrences of tropical cyclones is 8 per year, of hurricanes, 4.6; the respective totals are 581 and 339, of which 261 and 142, respectively, entered the U. S. Among the tables is a chronological listing of all storms and hurricanes, with pertinent dates, latitude and longitude of origin, point of recurvature, etc., but not including minimum pressures or maximum winds. The year-to-year variation in tropical cyclone activity is discussed briefly; the higher frequencies of both storms and hurricane since 1931 may be partially explained by improved observational coverage. *Subject Headings:* **1. Hurricane statistics 2. Hurricanes, North Atlantic (1886–1958) 3. Tropical storm tracks 4. North Atlantic.**—*R. S. Quiroz.*

11.7–284 551.515.23:632.117.1(442)

Lesage, G., **Note sur l'ouragan du 6 juillet 1957 en Forêt de Lyons.** [Note on the hurricane of July 6, 1957 in the Forest of Lyons.] *Revue Forestière Française*, Nancy, No. 11:737–745, Nov. **1959.** 3 figs.—Short historical review of the principal violent hurricanes which have devastated the forests in Normandy, generally occurring during winter. Account on the hurricane of July 6, 1957 and report of the damage caused in the Forest of Lyons (Normandy).

Subject Headings: **1. Hurricane damage to forests 2. Forest of Lyons, Normandy, France.** —*A.V.*

11.7–285 551.509.311:551.515.33(764)

Smith, Warren (*U. S. Weather Bureau*), **Mesoanalysis of a tornado-producing situation in Texas, May 25–26, 1955.** *American Meteorological Society, Bulletin*, 40(3):134–145, March 1959. 10 figs., 3 refs. **DWB, DLC**—The contrast between the macroscale synoptic patterns expanded to the mesoscale is illustrated by a series of maps showing a detailed analysis of surface conditions in Texas just prior to and during the destructive tornado outbreak of 25–26 May 1955. Hourly maps indicate the development and movement of the mesosystems and the interrelation of the parameters of pressure, temperature, precipitation, and radar, from a time when the pressure field is relatively undisturbed until the pressure disturbance moves out of the network area. Evidence of the formation of a pressure disturbance area was found prior to indications from any stations or radar reports. *Subject Headings:* **1. Mesoanalysis of tornadoes 2. Tornado, Texas (May 1955) 3. Texas.**—*Author's abstract.*

11.7–286 551.515.23(782)

Hoecker, Walter H., Jr. (*U. S. Weather Bureau*), **History and measurement of the two major Scottsbluff tornadoes of June 27, 1955.** *American Meteorological Society, Bulletin*, 40(3):117–133, March 1959. 7 figs., 3 tables, 5 refs. **DWB, DLC**—Fairly complete tornado life histories have been synthesized from over 100 still photographs and eight strips of color movie film taken of two tornadoes near Scottsbluff, Nebr., in June 1955. Funnel height and width measurements have been made from the still photographs, and translational speed has been determined at a few points and rotational speed at one point from the movies. Evidence of downward air motion in the vicinity of the second tornado was found, and in one instance cloud elements acting as air parcel tracers demonstrated the downward motion. Outline tracings of photographs illustrating significant size- and shape-changes are presented and measurements of interest are attached. All drawings are scaled to give the effect of observing the tornadoes from the same distance. Time lapse between the significant stages of each tornado has been estimated. Some definite relationships are shown to exist between the tornado height and width, and differences between the two tornadoes in time trends of the several dimensions are also shown. A model of tornado evolution is proposed. *Subject Headings:* **1. Tornado development 2. Tornado films 3. Tornado measurements 4. Tornadoes, Nebr. (June 1955) 5. Nebraska.**—*Author's abstract.*

11.7–287 551.515.8(94) 551.553.11(94) 551.509.317

Berson, F. A.; Reid, D. G. and Troup, A. J., **The summer cool change of southeastern Australia, Pt. 2, Effects of differential heating and the modification of advective change.** *Australia. Commonwealth Scientific and Industrial Research Organization. Division of Meteorological Physics, Technical Paper*, No. 9, **1959.** 69 p. 26 figs., 7 tables, 30 refs., 7 eqs. **DWB** (M11 A938t)—A monographic study of several specific mesosynoptic cases of the summer "cool change" over the eastern portion of South Australia and Western Victoria, with particular reference to effects of differential heating between land and ocean (large scale sea breeze, deep convection overland, case study of the development of the pressure field, and one of the coastal land and sea breeze); the origin of the air in the cold burst (using aircraft flight data through a coastal front), squall line frontogenesis on a pressure jump line (case study of a double cool change on March 28, 1955), the distribution of flow normal to the change using data of pilot balloon ascents at closely spaced stations for 4 seasons 1952–53 to 1956–57 (showing analysis, patterns, peculiarities and analogy to the hydraulic friction head). Appended are notes on methods of compilation and analysis, sources of data, and forecasting hints. Special as well as regular radiosonde observations were used for 1955–56 and 1956–57. A table gives percentage distribution of difference between forecast and observed time of cool change, showing a mean of 0.4 to 4.6 hrs for 12 hr forecasts (S.D.—6.1 and 6.9 hrs). (For Pt. 1, *see* 8.9–22, Sept. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Summer cool change, Southeast Australia 2. Cold fronts in Australia 3. Sea breeze forecasting 4. Southern Victoria, Australia.**—*M.R.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Hist. of solar radiation research** (Abbot), 11.7–56; **Radiation measurement** (Sharpe, Taylor), 11.7–118; **Sec. D1,** p. 1046; **Auroral-cosmic ray relationships** (Winckler et al.), 11.7–146; **Albedo measurement** (Mironova, D'iachkova), 11.7–236; **Global radiation data,** 11.7–242; **Radiative transfer** (Kondrat'ev, Senderikhina), 11.7–275; **Diffusion-turbulence relationships** (Hay, Pasquill), 11.7 276; **Solar radiation on slopes** (Zakharova), 11.7–378; **Cosmic ray ionization** (Sagalyn), 11.7–395.

11.7–288 551.521.1:621.47(791)

Solar research house will develop data for engineers. *Air Conditioning, Heating and Ventilating*, N. Y., 54(6):81–82, June **1957.** 2 figs. Also: **Economical solar heating nears.** *Ibid.*, 56(1):71–72, Jan. **1959.** figs., 3 photos. **DWB, DLC**—The first article describes and illustrates the Solar Energy Research Station at Tucson. It has a space heating-cooling system using solar energy in winter and net radiation exchange with night sky in summer. In addition to temperature, humidity, wind and pressure recording equipment the residential size structure has elaborate radiation recording equipment for measuring sunshine, solar and atmospheric radiation and atmospheric water vapor. A collector occupies the south-facing portion of the roof, thermal storage is by means of a water tank in basement. A heat pump is used in times of cloudy or very cold weather, making use of stratification of hot and cold water in tank. For summer cooling a reverse flow allows cool water from bottom to circulate in panels and radiator to operate from top (hot portion) of tank. In the second article the economic considerations for residential heating are stressed. Solar heating may prove to be most economical in those areas having the longest heating seasons because of the greater use for costly equipment and greater annual savings in fuel. *Subject Headings:* **1. Solar houses 2. Solar heating 3. Tucson, Ariz.**—*M.R.*

11.7–289 551.521.17:541.452

Schwarze, P. and Hoffschmidt, R., **Die Umwandlung von Cumarsäure in Cumarinesäure und umgekehrt im ultravioletten Licht.** [The reversible change from coumaric acid to coumarinic acid in ultraviolet light.] *Die Naturwissenschaften*, Berlin, 46(6):205–206, March **1959.** 2 figs. **DLC**—An alkaline solution of coumaric acid produces a yellow intensive fluorescence under a quartz lamp, while an alkaline solution of coumarinic acid shows no fluorescence. Under the influence of UV rays, this fluorescence has its maximum after 30 sec. The influence of UV not only changes coumarinic acid into coumaric acid but also produces an inverse reaction. The authors review the different experiments; placing coumarinic acid (5 cm^3 of a solution of 10 mg coumarinic acid into 50 cm^3 0.25n NaOH) under the influence of UV, it is shown that coumarinic acid is partly changed to coumaric acid. *Subject Headings:* **1. Acid transformation 2. Ultraviolet light effects on acids.**—*A.V.*

11.7–290 551.521.3:519.2

Ueno, Sueo, **La méthode probabiliste pour les problèmes de transfert du rayonnement. La réflexion diffuse et la transmission dans l'atmosphère finie avec la diffusion non cohérente.** [The probabilist method for the problems of radiation transfer. Diffuse reflection and transmission in a finite atmosphere with noncoherent diffusion.] *Académie des Sciences, Paris, Comptes Rendus*, 247(19):1557–1559, Nov. 10, **1958.** 4 refs., 17 eqs. **DWB, DLC**—Extending his probabilist method to a finite atmosphere with noncoherent diffusion, the author obtains the accurate solution of the transfer equation for the problem of diffuse reflection and radiation transfer in the conservative case. *Subject Headings:* **1. Radiative transfer 2. Diffuse reflection.**—*A.V.*

11.7–291 551.521.32:551.581

Knepple, Rudolf, **Zum Klima der atmosphärischen Wärmestrahlung.** [Climate of the atmospheric heat radiation.] *Germany. Deutscher Wetterdienst, Berichte*, 7(51):36–42, **1959.** 5 figs. German and English summaries p. 36. **DWB, DLC**—The atmospheric heat-radiation is not only significant for the radiation-balance of the earth, but also as an important climato-

logical element on account of its effects on humans and on account of its variability in time. To obtain some initial data on its behavior, it was attempted to determine approximate values covering a period of ten years and to evaluate them for climatological purposes. These values were obtained from noon observations at the climatological stations at Arcona (Ruegen) and Lindenberg. These computations revealed that the yearly curve of atmospheric heat radiation is almost parallel with the mean annual temperature. However, this applies only to monthly mean values. The daily mean values of this ten-year period often indicate an opposite behavior. From March to September the intensity of the radiation on the Baltic is considerably lower than inland, whereas from September to March, there is no such conspicuous difference. Finally, a significant relationship between the atmospheric heat-radiation and the different large scale weather types (Grosswetterlagen) were found. *Subject Headings:* **1. Radiation climate 2. Atmospheric radiation 3. Radiation intensities 4. Germany.**—*Author's abstract.*

11.7–292 535.37:523.16:551.521.6

Bibron, R. (*Ing., Dép. d'Electronique, Serv. d'Electronique Phys. Centre d'Etudes Nucléaires de Saclay*), **Mesure par scintillation des faibles activités du carbone 14 et du tritium.** [Measurement by scintillation of the low activity of carbon 14 and tritium.] *L'Onde Electrique*, Paris, 39(382):40–45, Jan. **1959.** 9 figs., 9 refs. **DLC**—The use of a coincidence method and the cooling of the photomultipliers makes it possible to eliminate the thermal noise of the multipliers. The residual background noise is due to the emission of light by each of these substances and this can be reduced by masking the photocathodes or by taking advantage of the neutral electronic time. The apparatus described makes possible the measurement of the very low activity of carbon 14 and tritium. *Subject Headings:* **1. Photomultipliers 2. Scintillation measurement techniques 3. Corpuscular radiation.**—*Author's abstract.* Ⓢ

11.7–293 523.7:551.521.6:551.593.9

Guigay, G. (*Observ. of Marseille*), **L'effet Poynting-Robertson.** [The Poynting-Robertson effect.] *Journal de Physique et le Radium*, Paris, 20(4):494–503, April **1959.** 5 figs., 11 refs., eqs. French and English summaries p. 494. **DLC**—When a particle moves into the sun's gravitation field, according to Poynting and Robertson, the radiation pressure is not directed along the straight line sun-particle, but possesses a component opposite to the particle's velocity. A simplified demonstration is given for the case of solar electromagnetic radiation and for that of corpuscular radiation. It is shown that the semi-major axis and the eccentricity of the orbit of the particle decrease continually: the particle falls in spirals on the sun. For a particle of 10^{-2} cm radius and a density of 4, the time of fall is about 10^6 yrs. For constant density this time is proportional to the radius. Effects on the distribution of the orbits in a meteoric current, on zodiacal light, and on the capture of meteoric bodies by the earth are mentioned. *Subject Headings:* **1. Meteoric astronomy 2. Electromagnetic radiation 7. Corpuscular radiation 4. Poynting-Robertson effect 5. Zodiacal light.** -*Author's abstract.* Ⓢ

TEMPERATURE

See also: **Stratospheric temp., Arctic** (Wexler, Moreland), 11.7 29; **Temp. effects on flowering and fruiting** (Parovshchikov), 11.7–88; **Temp. effects on winter wheat** (Lichikaki), 11.7 89; **Representativeness of temp. data** (Wanta), 11.7 227; **Lake breeze effects on temp.** (Vorontsov), 11.7–311; **Shelter belt effects on temp.** (Zakiev), 11.7–321; **Zero isotherm determination of snow line height** (Vitásek), 11.7 360; **Water vapor-temp.-precip. relationships** (Arakawa), 11.7–362; **Temp., Asturias** (Mateo Gonzalez), 11.7–370; **Temp. effects on sunset colors** (Ives), 11.7–391.

11.7–294 551.582.3:551.524.36

*Van Valkenburg, Samuel and Warman, Henry J. (*both, Clark Univ., Worcester, Mass.*) and Robison, William C. (*Regional Environments Res. Branch*), **Atlas of mean daily minimum temperatures.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Technical Report* EP-110, May **1959.** 25 p. mostly charts. **DWB** (M86 U585t No. 110)—Isotherms of mean daily minimum temperature at intervals of 9 Fahrenheit degrees (5 Centigrade degrees) are shown for January, April, July, and Oct., on 24 maps representing each continent except Antarctica. Isotherms are based upon data from

land stations only. *Subject Headings:* 1. **Minimum temperature atlases** 2. **World climatic atlases.**—*Authors' abstract,*

11.7–295 551.524.4:551.511.6:551.551.2

Inoue, Eiichi (*Natl. Inst. of Agric. Sci., Nishigahara, Tokyo*), **The effects of thermal stratification on turbulent diffusion in the atmospheric surface layer.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 319–330. fig., 23 refs., 41 eqs. **DWB, DLC**—In order to estimate the effect of thermal stratification on turbulent diffusion in the atmospheric surface layer, the probable changes in the turbulent structure under the nonadiabatic condition from that under the adiabatic condition have been considered semi-empirically. Making use of the so-called (log linear) law of wind velocity profile, i.e.,

$$\frac{U}{V^*} = 5.75 \log \frac{z}{z_0} - \sigma \frac{z}{L}$$

where L is the stability length (positive under the instability) defined by

$$L = \frac{V^3}{\frac{g}{\Theta_0} \frac{q}{c_p \rho}}$$

is a numerical constant, and all other notations are as usual, the increases in geometrical and dynamical properties of the frictional coupling-eddy with the instability are obtained in terms of both the roughness parameter (z/z_0) and the stability parameter (z/L). The dependence of the gustiness of the wind which corresponds to the diffusion angle of a fixed-source type diffusion, upon the stability ratio defined by $\Delta\Theta/U^2$, which is related to the stability length, has been examined by CRAMER'S (1957) observations. The possible further effects of L on diffusion phenomena are discussed and the similarity law of diffusion phenomena has been obtained in terms of both (H/z_0) and (H/L), where H denotes the characteristic height of the phenomena. *Subject Headings:* 1. **Temperature stratification** 2. **Turbulent diffusion.** —*Author's abstract.*

SOIL TEMPERATURE

See also: **Soil temp. effects on winter wheat** (Lichikaki), 11.7–89.

11.7–296 551.501.4:551.525.4:536.21

Broĭdo, A. G. and Suboch', N. A., **O tochnosti priblizhennogo metoda rascheta potoka tepla v pochve.** [Accuracy of an approximate method of soil heat flux calculation.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 77:99–103, **1958.** 4 tables, 15 refs., 2 eqs. **DWB, DLC**—The computational method of measuring vertical heat flux in the upper layers of the soil developed by G. KH. TSEĬTIN leads to the formula for determining vertical flux of heat in the upper 20 cm soil layer on the basis of station observations of surface temperature and at depths of 5, 10, 15 and 20 cm, namely

$$B = \frac{c}{\tau}\left[S_1 - \frac{a}{10} S_2\right] \text{ cal/cm}^2 \text{ min}$$

where c = mean total heat capacity of the upper 20 cm of the soil layer, τ—duration of the time interval between two adjacent observation periods, a = mean coefficient of temperature conductivity of the given soil layer for a given time interval, S_2 = function associated with the variation of temperature for given depths for the same interval. N. P. RUSIN simplified this formula to $B = (c/\tau)S_1$ cal/cm² min. In this paper the authors compare the values of heat flux in the soil over an interval of several hours computed by means of the "complete" formula designated B_c and the abbreviated formula designated B_a by using data for stations Dubovskaia, Kamennaia Steppe and Koltushi. Data on the distribution of absolute deviations of B_c from B_a according to sign, mean absolute deviations of B_a and B_c (cal/cm² min), mean relative deviations of B_a from B_c(%) and their distribution by intervals and mean relative deviations of B_a from B_c during different hours of the day are presented in tables. The ap-

plicability of the abbreviated formula is demonstrated. *Subject Heading:* **1. Soil heat flux calculation.**—*I.L.D.*

11.7–297 551.501.4:551.525.4:536.21

Breido, A. G. and Kozhar, S. L., **Opredelenie tochnosti stantsionnogo metoda rascheta koeffitsienta temperaturoprovodnosti pochvy.** [Determination of the accuracy of a station method for calculating the heat conductivity coefficient of the soil.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia. Trudy*, 77:95–98, 1958. 4 tables, 10 refs., 4 eqs. **DWB, DLC**—A precise method of computing the coefficient of heat conductivity of the soil is carried out according to the formula $a=M:N$ where $M=L\sum_{i=1}^{n}\alpha_i F(z_i,\tau$ and $N=\theta\sum_{i=1}^{m}\beta_i D(\tau_i)$. In these formulas L and α_i = coefficients depending only upon depths of the measurement of soil temperature, β = coefficient depending upon number of periods of time intervals considered, θ = interval of time between two adjacent observation periods, τ_i = periods of observation (in periods). F and D functions having the form

$$F(z_i,\tau)=\tau(z_i,\tau)-t(z_i,\theta)$$

$$D(\tau_i)=t(0,\tau_i)-t(h,\tau_i)+\frac{h}{H-h}[t(H,\tau_i)-t(h,\tau_i)]$$

where h and H = any two selected depths within the examined soil layer with $H>h$. The station method or the approximate method has a more simple expression for N_1 namely

$$N_1=\theta\left[\frac{D(\tau_1)+D(t_m)}{2}+D(Z_2)+\cdots+D(Z_{m-1})\right].$$

The coefficients of heat conductivity were made on the basis of observations on soil temperature at the surface and at 5, 10, 15 and 20 cm; $h=10$ cm and $H=20$ cm were selected and for each individual period of observation τ_i was transformed into the form $D=t_0+t_{20}-2t_{10}$, where t_0, t_{10} and t_{20} = soil temperature at the surface and at depths of 10 and 20 cm, respectively. Data on the distribution of absolute errors by sign, on the distribution of absolute errors by intervals cm² hour⁻¹, relative error (%) and distribution of relative errors by intervals are presented in tables. It is concluded that the station method of computing the coefficient of heat conductivity of soil is in general fully satisfactory but frequently it has elevated calculated coefficients. *Subject Heading:* **1. Soil heat conductivity calculation.**—*I.L.D.*

WATER TEMPERATURE

See: **Water temp., African coast** (Morgans), 11.7–193; **Sea surface temp. data** (Lepotier), 11.7–198; **Water temp. effects on rice** (Petrasovits), 11.7–382.

PRESSURE AND WIND

PRESSURE

See also: **Stratospheric wind and pressure fields, West Indies** (Groening), 11.7–328; **Orographic effects on cyclogenesis and pressure fields, Skagerrak** (Berg), 11.7–387; **Wind velocity-pressure relationships** (Koshinskiĭ), 11.7–388.

11.7–298 551.542:551.517:551.461.2

Zubov, N. N., **Vliianie barichekogo rel'efa na uroven' okeana i na iaveleniia vergentsii.** [Influence of pressure patterns on the ocean level and on the phenomena of convergence and divergence.] *Meteorologiia i Gidrologiia*, Leningrad, 6:52–54, June 1959. 8g., 4 eqs. **DWB, DLC**—The equation of Margules-Bjerknes for the slope of the surface of separation of water-atmosphere can be shown to be written on the basis of certain assumptions in the form

$$tg\,\gamma=-\frac{10}{\rho_2 g}\frac{\partial pa}{\partial x}$$

or $\Delta h = 10\Delta p$ where h is expressed in cm. and p in mb. In contrast to the static condition where $\Delta h = -\Delta p$ in the dynamic situation a fall of 1 mb in atmospheric pressure is accompanied by a fall of 10 cm in sea level. This equilibrium holds only when $\sigma_a C_1 = 1.02$ and $\sigma_a C = 0.5$.

In this equation c = velocity and subscripts w and a = velocity relative to water and air, respectively; and $C = \dfrac{1}{\rho_a 2\omega \sin \varphi} \dfrac{\delta}{\delta x}$. It is shown that in dynamic equilibrium the maintenance of equilibrium in a stationary anticyclone requires the outflow of water from the dome of equilibrium or the establishment of divergence; simultaneously at the upper periphery of the dome there is established a belt of elevated surface producing currents directed from the axis of the cyclone to its periphery. In the case of stationary anticyclones, convergence was established by water currents directed toward the axis of the anticyclone upward from below and along the horizontal from the periphery of the anticyclone to its axis. The principles are applied to the phenomena of floating ice. In such regions the establishment of cyclones is accompanied by rarefaction or even absence of ice floes and under the center of anticyclones the accumulation of ice floes. *Subject Headings:* 1. **Pressure effects on sea level** 2. **Convergence and divergence.**—*I.L.D.*

11.7–299 551.543 :551.515.8

Čadež, M., **Lokalne promene pritiska i prodori hladnog vazduha.** [Local pressure changes and invasions of cold air.] *Beograd. Prirodno-Matematički Fakultet Meteorološki Zavod. Rasprave*, No. 2:3–8. **1958.** table. 3 refs., 12 eqs. English summary p. 8.—The expression for the evaluation of the local pressure change during the invasion of cold air is derived. The influences of local pressure change immediately above the frontal surface, of the velocity of cold front, of the temperature change in cold air on account of the imparted heat and of the vertical motions, and of the horizontal gradient of temperature in cold air are discussed. *Subject Headings:* 1. **Pressure changes** 2. **Cold air invasions.**—*Author's abstract.*

11.7–300 551.547.1 675

Jones, L., **Considérations sur le nivellement barométrique au Congo Belge.** [Remarks on barometric levelling in the Belgian Congo.] *Belgium. Académie Royale des Sciences Coloniales. Bulletin des Séances*, N.S., 5 (2):402–412. **1959.** 7 refs. DWB—Analysis of the nature of errors affecting the barometric levelling based on the important altimetrical survey made in the Congolese punch-bowl. This examination shows that the results of barometric levelling should have a casual character: their propagation along the levelled polygonal lines. The author compares the various methods actually applied, their similarity and their differences as regards their "productive" character. Author considers the method of itinerant observations the most inexpensive and the one that makes it possible to survey the greatest number of stations in a day; it has a wide radius of action and makes the greatest use of the regularity of the barometric tide in Central Africa. Taking into account the problems which remain to be solved, a review is given of the research program that could be used in the Belgian Congo in order to determine, definitively, a basis for barometric levelling in Central Africa. *Subject Headings:* 1. **Barometric levelling** 2. **Atmospheric tides** 3. **Central Africa** 4. **Belgian Congo.**—*A.V.*

WIND AND TURBULENCE

See also: **Turbulence encountered by Bristol Freighter aircraft** (Heath-Smith), 11.7–74; **Synoptic conditions for aircraft bumpiness** (Bugaev et al.), 11.7–75; **Turbulence effects on jettisoned aircraft fuel** (Lewell), 11.7–77; **Representativeness of wind data** (Wanta), 11.7–227; **Turbulence spectra** (Solomonik), 11.7–239. **Objective wind forecasting, Wigram** (Summers), 11.7–267; **Turbulent transfer of heat** (Hinze), 11.7–277; **Thermal stratification effects on turbulent diffusion** (Inoue), 11.7–295; **Jet stream turbulence** (Raethjen), 11.7–329; **Evap. from wind-swept surfaces** (Myrick), 11.7–539.

11.7–301 551.551.6 :551.511

Businger, J. A.; Suomi, V. E. et al., **Studies on the structure of turbulence.** Wisconsin. Univ. Dept. of Meteorology. Contract AF 19 604-1384. Final Report. Aug. 31, **1958.** 64 p. figs., table, refs., eqs. **DWB** (M 051 W81s). Individual papers are as follows: Businger,

J. A., **A generalization of the mixing length concept,** p. 1–15 (also published in *Journal of Meteorology*, 16(5):516–523, Oct. **1959**); Businger, J. A., **Similarity and dissimilarity between turbulent transfer of heat and momentum near earth's surface,** p. 26–44; Panofsky, H. A., **The spectrum of vertical velocity,** p. 45–56; Businger, J. A., **Sonic anemometer-thermometer observations, Hancock, Wisc. 1957,** p. 57–61. (Papers will be abstracted separately.)—The second paper is a theoretical study; the other three experimental studies. The first and the third papers are based on data obtained at O'Neill, Nebraska. The fourth paper tabulates sonic anemometer-thermometer observations at Hancock. The first and the third papers have made ample use of graphic illustrations. *Subject Headings:* **1. Turbulent transfer of heat 2. Turbulent transfer of momentum 3. Turbulence research. I. Panofsky, H. A.**—*I.S.*

11.7–302 551.551.25:551.507.7 551.551.5:551.507.352

Lappe, U. O.; Davidson, B. and Notess, C. B., **Analysis of atmospheric turbulence spectra obtained from concurrent airplane and tower measurements.** Presented at the IAS Meeting, N. Y. City, Jan. 1959. *Institute of the Aeronautical Sciences, IAS Report* 59-44, **1959.** 21 figs., 2 tables, 11 refs., 8 eqs. **DWB** (629.1308 159re)—The results of several research programs aimed at providing a better understanding of turbulence behavior at low altitude are summarized. Two techniques used for measuring gust velocity components from instrumentation mounted (1) in an airplane and (2) on a tower, are described briefly. Power spectral density estimates of the orthogonal turbulence components obtained from concurrent tower and airplane measurements are compared to test the hypothesis of G. I. Taylor that turbulence measured at a fixed point as a function of time can be simply related to turbulence encountered along a path in space. The fixed point tower records analyzed in this experiment covered periods of about one hour and mean wind speeds of about 20 mph; the flight records represented a 2 min sample covering a spatial path of about 10 mi. The results of these comparisons are discussed and some effects of altitude, mean wind speed, and terrain upon the intensity and shape of the spectral curves are shown. *Subject Headings:* **1. Turbulence spectrum 2. Low level turbulence 3. Airplane turbulence observations 4. Tower data.** —*Authors' abstract.*

11.7–303 551.551.25:551.510.42

Morton, B. R. (*Dept. of Math. Univ. of Manchester*), **The ascent of turbulent forced plumes in a calm atmosphere.** *International Journal of Air Pollution*, N. Y., 1(3):184–197, Jan. **1959.** 2 figs., 4 tables, 12 refs., 9 eqs. **DWB, DLC**—This paper gives predictions of the heights of forced plumes generated when smoke or other effluent is discharged vertically into a stably stratified atmosphere under calm conditions. The theory, which is given in outline, is based on an earlier model treatment of plumes and assumes that mean profiles across the plume of vertical velocity and excess potential temperature are of similar form at all heights and have widths in constant ratio, and that the inflow velocity due to mixture at the plume edge is proportional to the mean vertical velocity within the plume. There are two undetermined constants in the theory, and values for these are deduced from published data on jets and plumes. The forced plume from an actual source discharging a stream of buoyant effluent can always be related to a virtual point source of heat and momentum only, and the treatment shows how the position of the virtual source may be found. The ascent of forced plumes in a stable atmosphere with a linear profile of potential temperature is then investigated in terms of these virtual sources; it is shown that the height of the plume-top at first decreased as the momentum flow from the virtual source is increased from zero, and then increases without limit. The discharge of cold effluent is also considered. The practice of discharging stack gases at high velocity does not provide a practical method of increasing plume heights in calm weather, for the mechanical energy needed to give even a moderate increase in the plume height is quite prohibitive. *Subject Headings:* **1. Turbulent diffusion 2. Stack effluent diffusion.**—*Author's abstract.*

11.7–304 551.551.5:551.501.81:523.51

Greenhow, J. S. and Neufeld, E. L. (*both, Univ. of Manchester, Jodrell Bank Experimental Station*), **Turbulence at altitudes of 80–100 km and its effects on long-duration meteor echoes.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 16(3/4):384–392, Nov. **1959.** 4 figs., 11 refs., 6 eqs. **DWB, DLC**—The two theories of long-duration radio echoes from meteor

trails based on scattering from an over-critically dense ionized column, and incoherent scattering from a trail rendered underdense by small scale turbulence are compared. Examination of the characteristics of enduring meteor echoes shows that the incoherent scattering theory is untenable, if small scale turbulence with a time contact of only 0.4 sec is assumed to be present. All the phenomena observed during the lifetime of a long duration meteor echo are readily explained on the basis of multiple reflections from overdense trails. The time constant and scale of the smallest eddies at heights of 80–100 km are shown to be at least 30 sec and 30 m, respectively. *Subject Headings:* **1. Turbulence effects on meteor echoes 2. Radio echoes from meteor trails.**—*Authors' abstract.* Ⓢ

11.7–305 551.551.5:551.558.1

Krŭstanov, L. and Ĭordanov, D., **O vyvode teplovogo potoka pri svobodnoĭ konvektsii i atmosfere.** [Derivation of the heat current with free convection in the atmosphere.] *Bŭlgarska Akademiia na Naukite, Sofia, Doklady*, 12(3):187–190, May/June, **1959.** ref., 13 eqs. English summary p. 190. **DLC** –The expressions for the heat current (8) and the coefficient of turbulence (9) by pure free convection are derived on the basis of simplified conceptions of the semi-empirical theory of turbulence. The developed free convection is examined as a turbulent movement, characterized by turbulent pulsations of speed W_T', scale of turbulent elements l_T and horizontal pulsations of temperature $T''_2 - l_T$. The constant λ in (5) is a relation between the scales of pure free convection at $\gamma \gg \gamma a$ and the mechanical turbulence at $\gamma = \gamma a$ in the ground layer. The values of λ conform to the condition $1 \leqslant \lambda \leqslant 1.91$. *Subject Headings:* **1. Convective heat exchange 2. Turbulent exchange.**—*Authors' summary.*

HORIZONTAL WIND DISTRIBUTION

See also: **Orographic disturbances in wind field** (Koshinskiĭ), 11.7–388.

11.7–306 551.552:551.555.9(449.45)

Alt, J., **Notes sur le vent au sol à Bastia-Poretta.** [Account of surface wind at Bastia-Poretta.] *France. Météorologie Nationale. Notice d'Instructions Techniques*, Sec. 10, No. 6, March **1958.** 3 charts, table. Mimeo. –Analysis of wind observations at the climatological stations in Corsica indicates that the rugged relief of the island results in considerable variation of wind direction and speed. A table gives, for the various months of the year, a comparison between surface wind observations made at 3 Corsican meteorological stations. Analyzing these observations and studying the stream lines over Corsica permits, in general, the adoption of the rule that wind from the W-sector exceeding 15 kn at Corsica Cape, is a warning of violent W-ly or NW-ly winds at the northern approaches of the airport of Bastia. *Subject Headings:* **1. Surface wind data 2. Orographic influences 3. Bastia-Poretta, Corsica.**—*A. V.*

11.7–307 551.552(52)

*Japan. Meteorological Agency, Tokyo, **Report of investigations on winds of various places in Japan.** Its *Memoirs*, 39(4), **1957.** 226 p. tables, figs. Contents: Nakahara, M.: **Investigation on winds of principal cities in Japan,** p. 1–154. Hatakeyama, H. and Nakahara, M.: **Distribution of local winds in the regions of Hakodate, Keihin, Nagoya, Hanshin and northern Kyushu,** p. 155–226. **DWB**—M. Nakahara's paper presents a detailed analysis of the wind direction, speed and scale for 86 cities on the basis of extensive wind data obtained during the period Jan. 1, 1946–Dec. 31, 1948. The study consists of the following: the characteristics of wind and each city's orography, the wind phenomena in each area, the characteristics of heavy wind from sea and land, and each city's wind rose. The wind rose shows monthly windvane frequency, prevailing wind direction and speed for every 8 hours (6 a.m., 2 p.m., and 10 p.m. intermittently), and percentage from 16 directions and 17 classes based on intensity (using only wind speed at 0.5 m/s below). Thus a year wind rose for each city shows the horizontal figures for each month and vertical figures for every 8 hours. Hatakeyama and Nakahara's study is slightly different from the first one. Meteorological data obtained with 20 simple weather installations placed in each of the 5 regions during the period 1942–1944 for the observation of local wind speed and direction with Robinson's cup anemometer and anemoscope. Wind roses in the second study are based on observation made every 8 hours except

in the Keihin region where they were made every 4 hours, and each wind rose was made on the basis of season not of month. A suggestion made for forecasting purposes was that winter-spring was much higher than summer-autumn for frequency of fire damage. *Subject Headings:* **1. Wind regime, Japan 2. Local winds 3. Wind distribution 4. Japan.**—*K.C.*

11.7–308 551.552:551.432(235.24)

Lo, Szu-wei, **Stability of the velocity field over Tibetan Plateau and its surroundings.** *Acta Meteorologica Sinica*, Peking, 28(4):326–330, **1957.** 6 figs., 2 refs. In Chinese. **DLC.** *Subject Headings:* **1. Air flow over mountain ranges 2. Tibetan Plateau.**

11.7–309 551.552:551.510.721:551.501

McCabe, John T. (*10th Wea. Group, APO 925, San Francisco*) and Potter, Thomas D. (*Hdq., Air Weather Service*), **A method for the construction of climatological fallout-dose patterns.** *American Meteorological Society, Bulletin,* 40(11):561–565, Nov. **1959.** 7 figs., table, 10 refs. **DWB, DLC**—A simple method of finding the percentage frequency that areas near a target will be affected by radioactive fallout of a critical dose is presented. The target location, the climatological period, the fission yield, and a critical dose or dose rate must be specified. If the distribution of the actual effective winds is not available, the assumption of a circular normal distribution of the effective wind is made. This distribution can be obtained by C. E. P. Brooks' method or, if the points are numerous as in describing an areal frequency pattern, by a mechanical method described herein. *Subject Headings:* **1. Radioactive fallout dose patterns 2. Wind distribution.**—*Authors' abstract.*

WIND VARIATIONS

See also: **Monsoon fluctuations** (Morgans), 11.7–193; **Wind speed averaging** (Andreev), 11.7–232; **Wind variation effects on spectral turbulence** (Salamonik), 11.7–239; **Wind speed estimation** (Jordan), 11.7–250; **Sea breeze forecasting** (Berson et al.), 11.7–287; **Monsoon clouds** (Sharp), 11.7–346.

11.7–310 551.553.11

Haurwitz, B., **A linear sea breeze model.** New York. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography, Contract DA-36-039-Sc-78091 (Study of Sea Breeze Theory), Quarterly Progress Report No. 3, Jan. 15–April 15, **1959.** 35 p. 5 figs., 3 refs., eqs. **DWB** (M53.11 N532se)—In preparation for the numerical computation of a nonlinear sea breeze model the corresponding linearized model is studied analytically. The results show generally good agreement with the broad features of the sea breeze circulation. Because the linear theory neglects the advective effect of the sea breeze on the temperature contrast between water and land the sharp onset of the sea breeze which is often observed is not reproduced by the theory, however a more elaborate linear theory can be constructed to give a sharp sea breeze front. *Subject Heading:* **1. Sea breeze circulation**—*Author's abstract.*

11.7–311 551.553.11:551.524.35(285:470)

*Vorontsov, P. A., **O brizakh Ladozhskogo ozera.** [Lake Ladoga breezes.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 73: 87–106, **1958.** 14 figs., 7 tables, 5 refs. **DWB**—The breeze period over Ladoga Lake was observed during anticyclonic weather. Most of the lake breezes, especially at Priozersk, developed like cold incursions and were accompanied by abrupt drops in temperature on an average of 1° and an increase in relative humidity on an average of 9%. In Novaia Ladoga the earlier the beginning of the morning breeze the greater was its diurnal maximum. The beginning of the breeze varied between 7 to 14 h. The height of the breeze varied between 200 and 900 m. It was characterized by low wind velocities with a maximum wind velocity at a level 0.15–0.20 of the maximum height of the breeze. At the coastal stations the typical features of marine climate with small amplitude of temperature and humidity were observed. For Lake Ladoga the time of start of the breeze from sunrise τ in hours is a function of the magnitude of counter development of the breeze of the horizontal pressure gradient dp/dx, and $\tau = 5(dp/dx) + 4.5$. The relationship between the magnitude of the maximum height of the lake breeze H_{br} and dt/dx horizontal temperature

gradient at the earth is given by $H_{br}=a[(dt/dx)-5]$ where a = a coefficient equal to 0.71 for the Novaia Ladoga district. The shore breeze on Lake Ladoga is weakly developed and as a rule is reflected during favorable synoptic conditions only as some wind reversal towards the lake in the 100–200 m layer. Extensive numerical and graphical data are presented on wind and temperature studies of the breeze, on the temperature differences between land and lake, etc. *Subject Headings:* **1. Lake breezes 2. Temperature drop 3. Lake Ladoga, U.S.S.R.** – *Based on author's abstract (I.L.D.)*

11.7–312 551.553.2(43)

Troeger, Heinz (*Bremen*), **Windvergleiche in Norddeutschland.** [Comparisons of wind in northern Germany.] *Annalen der Meteorologie*, Hamburg, 8(11/12):335–336, **1959.** fig. **DWB, DLC**—Comparisons between two anemometers which are 100 or more kilometers apart constitute usually a useless task since difference in local conditions plays an important rôle - hence the quotient (Q) of the annual mean of wind velocities of the two stations in the course of years shows usually considerable fluctuations. Occasionally anemometers of two stations show considerable constancy over decades. This is illustrated by the wind velocities at the Deutsche Seewarte and the Meteorologisches Observatorium in Potsdam during 1899–1919. In this period Q fluctuates at most 2–3% above the smoothed mean. Between 1912 and 1919 the values lie upon a smooth curve without any substantial fluctuations. Before 1899 the quotient varies considerably and after 1920 the variation of Q is even greater. *Subject Headings:* **1. Wind comparisons 2. North Germany.**—*I.L.D.*

11.7–313 551.553.6(98)

Shapaev, V. M., **O sutochnom khode povtoriaemosti napravleniĭ vetra na arkticheskikh ostrovakh.** [The daily variation of the frequency of wind directions on Arctic islands.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:32–33, Dec. **1958.** 2 refs. **DLC.** Transl. into English by John Miller, issued by American Meteorological Society under Contract AF 19(604)-1936, June **1959.** Complete.—The diurnal variation in wind direction on Arctic islands was studied on the basis of standard observations for 1936–1938 at 12 polar stations, including for Rudolph Island, Calm Bay (Franz Josef Land), Russian Harbor, Matochkin Shar, Dickson Island. The mean daily wind frequency in winter (November–March) and summer (June–August) was analyzed over a 3-year period. A daily variation in wind frequency is lacking almost entirely in winter or is very slight, consisting of a semidiurnal wave with a maximum at varying times. Those slight variations in frequency of wind direction are the result of daily variations in pressure. In summer there is some variation in the diurnal frequency of wind direction. These variations can be classified into two groups. One is characterized by air currents observed during entrance and exit from the straits. The maximum frequency of the wind directions (east and west winds) is at night and in the morning, the minimum is in the evening. The other group includes air currents directed from island to sea and having a maximum frequency at noon and a minimum at night. The possible causes of these different wind direction frequencies and their characteristics over the various islands are discussed. *Subject Headings:* **1. Wind direction variability 2. Diurnal wind variations 3. Arctic.**—*I.L.D.*

SPECIAL WINDS

See also: **Frontal föhn effects** (Kuhnke), 11.7–101; **Flood effects on blood clotting** (Zürcher), 11.7–102; **Dust storms** (El-Fandy), 11.7–272; **Surface wind, Bastia-Poretta** (Alt), 11.7–306.

11.7–314 551.555

Davidson, Ben, **Observation and theory of local wind systems.** N. Y. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography, Contract DA-36-039-Sc-78127, Quarterly Progress Report No. 3, July 1–Sept. 30, **1959.** 6 p. fig. **DWB** (M(051) N532Lo)—The Vermont field experiments during July–September are described in general. The status of the data reduction stage is discussed briefly. *Subject Heading:* **1. Local winds.** —*Author's abstract.*

11.7–315 551.555.3:343.9.01

Meixner, Franz, **Föhn und Kriminalität.** [Föhn and criminality.] Hamburg, Verlag Kriminalistik, **1955.** 48 p. 26 figs., 24 tables, 10 refs. Price: DM 2,80. Review by H. Ungeheuer in *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:186, **1958.**—Simple statistical data are presented on the distribution of crimes (suicides, lost persons, traffic accidents, homicides, and sexual crimes) in relation to föhn occurrence. Most of the material analyzed is for Munich, Germany, 1951–1953. No correlation, either positive or negative, is found between föhn and the number of crimes. *Subject Headings:* **1. Föhn effects on criminality 2. Munich, Germany.**—*G.T.*

11.7–316 551.555.3:551.586.612(234.3)

Obenland, Eugen, **Zur Biotropie des Alpenföhns.** [Biotropism of Alpine föhn wind.] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):81–87, **1959.** fig., 2 tables, 16 refs. German, English and French summaries p. 81. **DWB, DLC** –From five year official data of death, given in exact hours, concerning the valley of the upper Iller and the adjacent region of the Alp margin, all days showing an accumulation of deaths are derived. The frequency of such days, being 3.6% at anticyclonic weather, increases to 9.8% at the weather type "fore part of low pressure area with temporary föhn attacks"; the difference approaches the value necessary for significance. Examples show that accumulations don't regularly coincide with the times of föhn attacks, but appear in part of the cases during the following cold front. With examples it is also demonstrated that different weather situations cause accumulations of deaths. Thus a superestimation of biotrope effect of föhn is not justified. A present study of the influence of föhn attempts to discover its advance into pre-Alp areas. *Subject Headings:* **1. Föhn sickness 2. Alps.**—*Author's abstract.*

11.7–317 551.555.4(470)

*†Akademiia Nauk SSSR. Morskoĭ Gidrofizicheskiĭ Institut, **Novorossiĭskaia bora.** [Bora at Novorossisk.] Its *Trudy*, Vol. 14, **1959.** 139 p. 60 figs., 21 tables, 45 refs., eqs. **DWB** (M(055) A313tr)—The main purpose of this investigation of the Novorossisk bora (a strong northeast cold wind blowing from the surrounding mountains with a speed of 40–60 m/sec and a temperature drop to −20°C and below) carried out by the personnel of the Maritime Hydrophysical Institute's Laboratory of Sea Aerology was to study the aerological structure of the bora, to find out the physical causes of the phenomenon, and to work out a method for its forecasting. The study of the Novorossisk bora under natural conditions continued from 1951 to 1955, and the study of earlier observational data started in 1947. *Subject Headings:* **1. Bora 2. Novorossisk, U.S.S.R.**—*A.M.P.*

WIND EFFECTS

See also: **Wind mills** (Fateev), 11.7–10; **Wind effects on glider flights,** 11.7–79; **Wind machines** (Juul), 11.7–109; **Wind effects on sand** (Arbey), 11.7–186; **Wind effects on sand** (Steinberg), 11.7–187; **Wind effects on ice pack** (Ono), 11.7–199.

11.7–318 551.556:551.311.1(65)

Capot-Rey, R. (*Faculté des Lettres, Univ. d'Alger*), **Sur une forme d'érosion éolienne dans le Sahara Français.** [A form of wind erosion in the French Sahara.] (In: **The Earth: its crust and its atmosphere.** Pub. Leiden, E. J. Brill, **1957.** p. 28–33. 2 figs., 6 photos, 8 refs.) **DLC** (GB7.E2)—The "Zbara" are clay mounds 2–5 m high occurring at irregular intervals along the northern border of the plain at Tidikelt, central Algeria (27°10′N, 2°10′ to 30′E). Prevailing winds are from the northeast with annual frequency of 30% of all observations (including calms), and occurring not only in summer but throughout the year. A few of these formations are illustrated and their cross sections and profiles shown diagrammatically. Text gives details of their formation by wind erosion. *Subject Headings:* **1. Geomorphology 2. Wind erosion 3. Zbara 4. Tidikelt Oases, Algeria.**—*M.R.*

11.7–319 551.556.2:634.9:551.578.46(470)

*†Kopanev, I. D., **Vliianie lesnykh polezashchitnykh polos na raspredelenie snezhnogo pokrova v zasushlivoĭ zone Evropeĭskoĭ Territorii SSSR.** [Effect of forest shelter belts on

snow cover distribution in the dry zone of European Russia.] Leningrad, Gidrometeoizdat, 1955. 65 p. 6 figs., 24 tables, 45 refs. At head of t-p.: Glavnaia Geofizicheskaia Observatoriia. DWB (M78.46 K83vL) —A detailed study of this effect was carried out under supervision of the author at 7 representative agrometeorological stations of the zone during the winters 1951–52 and 1952–53. The investigation, based on snow cover thickness measurements and anemometric observations, had for its purpose the determination of 1) snow accumulation conditions, the distribution and thickness of the snow cover in shelter belts of varying height and density and in adjoining sheltered fields as compared with open fields and 2) the quantity of water obtained from the melted snow cover both in sheltered and open fields. The results are presented in a large number of tables and conclusions on the most advantageous type of shelter are discussed. *Subject Headings:* **1. Shelter belt effects on snow cover 2. Snow cover distribution 3. European U.S.S.R.** *A.M.P.*

11.7–320 551.556.2:551.584.41

Mirkin, S. L., **Vliianie polezashchitnykh lesonasazhdenii na klimat i gruntovye vody v oroshaemykh raionakh.** [Effect of forest shelter belts on the climate and ground water of irrigated regions.] (In: Akademiia Nauk SSSR. Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** Moscow, 1957, p. 332–339. 8 refs.) **DLC** (QC940.R9A6)—A theoretical discussion of the problem based on numerical data found in recent literature. The author concludes that the purpose of protective afforestation in irrigated regions is protecting adjoining fields from wind, in order to reduce air exchange, and preventing the carrying away of the lowest air layer which has been moistened and cooled by evaporation and transpiration from the irrigated fields. These functions can be successfully carried out by thin (not dense) forest belts (1–3 rows of trees on both sides of the channels). *Subject Heading:* **1. Shelter belt microclimatology.**—*A.M.P.*

11.7–321 551.556.2:551.524.35:551.571.3(47)

Zakiev, Kh. Ia., **Vliianie lesnoĭ polosy na izmenenie rezhima vlazhnosti i temperatury vozdushnogo potoka u poverkhnosti Zemli.** [Effect of a shelter belt on the change in the moisture and temperature regime of the air current near the earth's surface.] (In: Akademiia Nauk SSSR. Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** Moscow, 1957. p. 311–321. 7 figs., 4 refs.) **DLC** (QC940.R9A6) Method and results of a detailed study of the question of the most advantageous distribution of forest belts in an arid steppe, and an evaluation of their meteorological effectiveness are presented. The study was carried out in the Salsk Steppe in July–August, 1949–1952 by an expedition from Rostov-on-Don State University and Pedological Institute, and the Tashkent Geophysical Observatory. The results showed that the meteorological regime of a limited portion of the lower air layer (up to 6 m height) is definitely influenced by weather condition, the type of underlying surface and the extent of its moistening. In conclusion, the author discusses and determines the optimum conditions for the future planting of protective forest belts in the Salsk Steppe. *Subject Headings:* **1. Shelter belt effects on air currents 2. Temperature variations due to shelter belts 3. Humidity variations 4. Salsk Steppe, U.S.S.R.** *A.M.P.*

11.7–322 551.556.3:621.311.4(54)

Nilakantan, P., **Some considerations affecting the choice of areas for preliminary wind power surveys in India.** *UNESCO, Arid Zone Research,* 7:38–41, 1956. ref. French and Spanish summaries p. 40–41. **DWB, DLC** —An examination of the extent to which meteorological records and observations can be used with advantage in preliminary surveys for estimating available wind power in India and the selection of the most favorable sites for location of high capacity wind generators. The role of topography in influencing wind circulation and in the location of generators, the correction factors necessary that the wind observations may be considered as typical of the surrounding area and the guiding factors to be considered in selecting areas for preliminary site surveys apart from the meteorological observations of wind velocities at stations in or around the area are considered. Specific examples from India are cited in the discussion of these aspects of wind power generators. *Subject Headings:* **1. Wind power studies 2. India.**—*I.L.D.*

11.7–323 551.556.4:551.311.3(797)

†Hilst, Glenn R. and Nickola, Paul W. (*Gen. Electric Co., Richland, Wash.*), **On the wind erosion of small particles.** *American Meteorological Society, Bulletin*, 40(2):73–77, Feb. **1959.** 4 figs., table, 30 refs. **DWB, DLC**—The importance of wind erosion with respect to soil conservation and to the spreading of noxious particles subsequent to deposit on a soil surface is indicated. The processes of wind erosion and transport are reviewed and are then illustrated by some measurements made at Hanford. Particle, surface, and meteorological factors which influence erosion by wind are listed and discussed briefly. *Subject Headings:* **1. Wind erosion 2. Soil conservation 3. Hanford, Wash.**—*Authors' abstract.*

UPPER AIR WINDS

See also: **Stratospheric winds, Arctic** (Wexler, Moreland), 11.7–29; **Synoptic conditions for aircraft bumpiness** (Bugaev et al.), 11.7–75; **Upper air wind measurement** (Groves), 11.7–129; **Upper air wind computation** (Panenka), 11.7–238; **Jet stream clouds** (Sharp), 11.7–346.

11.7–324 551.557

Barbé, Georges, **Sur l'existence de vents de secteur Est, dans la haute atmosphère, au dessus de la région parisienne, au cours de l'hiver 1956–1957.** [The existence of easterly winds in the high atmosphere, above the Paris region, during the winter 1956–1957.] *Académie des Sciences, Paris, Comptes Rendus*, 247(4):493–496, July 28, **1958.** 3 figs., 2 refs. **DWB, DLC**—From Feb. 2 up to and including March 13, 1957, excluding March 5, 6 and 7, easterly winds were recorded at Trappes in the vicinity of Paris, between 20 and 30 km vertical elevation. The characteristics of this abnormal stratospheric circulation were as follows:

a) The wind speed was variable and sometimes showed a very rapid increase; on Feb. 7, it fluctuated from 20 km/h at 17 km to 216 km/h at an altitude of 27 km.
b) The rotation of the wind in the eastern sector occurred from the north.
c) It seemed that this layer of stratospheric easterly winds was surmounted by a layer of westerly winds, the base of which topped an altitude of 30 km. These conditions are exactly opposite to what happens during the seasonal summer stratospheric easterly winds. *Subject Headings:* **1. Stratospheric winds 2. Jet stream 3. Trappes, France.**—*A.V.*

11.7–325 551.557:519.24

†Essenwanger, Oskar (*Asheville, N. C.*), **Probleme der Windstatistik.** [Problems of wind statistics.] *Meteorologische Rundschau*, Berlin, 12(2):37–47, March/April **1959.** 4 figs., 3 tables, 50 refs., 12 eqs. English summary p. 37. **DWB, DLC**—Five years of upper air wind data for various levels serve to test the theory of the Poisson distribution law, the negative binomial distribution, the circular and elliptical normal distribution (Maxwell's distribution law) against observed values. Poisson's law and the negative binomial distribution law have only limited application to surface data and then only as a first approximation. Wind data may follow only mainly an elliptical normal distribution while the circular normal distribution is only a special case of the elliptical one. This "Maxwell distribution" law is applicable only to the momentary value of the wind, in particular when wind turbulence influences the data. It is also valid for the movement of air particles. The elliptical wind distribution generally is treated by decomposing the wind vector data into components v_x and v_y. The average wind data available in synoptic and climatological observations (mean vector over time) or in aerological data (mean vector over space) are represented directly as statistical parameters of wind velocity and wind direction and a two dimensional "polar" normal distribution is defined. The comparison with observations was excellent. A square wind scale which is related to the wind energy appears to be the natural scale for a normal distribution of the wind speed. *Subject Headings:* **1. Upper air wind data 2. Statistical studies of winds aloft.**—*Based on author's abstract (I.L.D.).*

11.7–326 551.557:551.513.2

*Panofsky, H. A.; Krawitz, Lowell and Julian, P. R., **Study and evaluation of relations between tropospheric and stratospheric flow.** Pennsylvania. State Univ. Mineral Industries Experiment Station. Dept. of Meteorology, Contract N189 (188)-34785A, Final Report

Aug. 1, 1958. 91 p. figs., tables. 6 refs. DWB M57 P415 —An extensive study of relations between mean low at 500 mb and at 100 and 50 mb at the same time and 12 hrs later, respectively, showing that the space-mean 500 mb flow is usually about the same as the 100 mb wind speed, except in summer and in regions influenced by the polar vortex. In the latter case the 100 mb flow is faster. Latitudinal factors are also important. Correlations between 100 and 50 mb are shown for Jan. and Dec. 1958 for several latitude belts. Many charts and correlation diagrams are included with the data. *Subject Headings:* 1. Stratospheric-tropospheric flow relationships 2. Northern Hemisphere.—*M.R.*

11.7–327 551.557:551.509.34

U. S. Navy Weather Research Facility. **Upper-wind specifications from 500-MB data an interim report.** Norfolk, Virginia, Nov. 1957. 30 p. 8 figs., 5 tables. DWB M5 U582up —A treatise on the possible accuracy of specification of winds above 500 mb from contour maps and from single station data to 500 mb. Temperature and vorticity gradients at 500 mb are shown to be related to wind speed shears from 500 to 300 or 200 mb. Errors in winter are appreciable. Temperature gradients at 500 mb are not reliable indicators of wind direction changes above 500 mb. *Subject Headings:* 1. Upper air wind estimation 2. 500 mb data extrapolation 3. Single station data specification. I. Austin, J. M. II. Somervell, W. L., Jr. —*M.R.*

11.7–328 551.557.2:551.547.5(54)

Goeting, Hans Ulrich (*Univ. of Chicago*). **Wind and pressure fields in the stratosphere over the West Indies region in Aug. 1958.** *U. S. Weather Bureau, National Hurricane Research Project Report*, No. 35, Dec. 1959. 10 p. 8 figs., 2 tables, ref., 4 eqs. DWB M15.2 U5845r —The high level wind and pressure fields over the West Indies area in August 1958 are investigated. In the stratosphere, at 50 mb and 25 mb the steady easterly flow is found to be quasi-geostrophic. Since contour analyses do not give a true picture of the wind field at these high levels, due to the inaccuracies of the pressure-height data, a method to eliminate these shortcomings is outlined. *Subject Headings:* 1. High-level winds 2. Stratospheric pressure 3. West Indies.—*Author's abstract.*

11.7–329 551.557.5:551.551.5

§Raethjen, Paul. **Die Entstehung des Jet-stream und seiner Turbulenz.** [Origin of the jet stream and its turbulence.] *Annalen der Meteorologie*, Hamburg, 8 [5/4]:108–114. 1957. 8 figs. Nos. 3–8, in pocket. 4 refs. DWB, DLC Turbulence at the ground layer and in the free atmosphere is associated with energy dissipation in the friction layer and in unstable clouds respectively. The more intensive "clear air turbulence" generally occurs on the cold edge of the jet stream. In the direction of the wind, severe turbulence occurs on the left or cold side of the jet stream (in the Northern Hemisphere). With the aid of vertical sections through the jet stream made by J. K. Bannon (*Met. Mag.*, 81:97. 1952) and E. Palmén and C. W. Newton (*J. Met.*, 5:220. 1948), it is shown that strong turbulence occurs on the left (cyclonic) shearing area, where the absolute vorticity attains a maximum. This cyclonic shearing edge of the jet stream is its actual "friction edge." Considering the origin of the jet stream as identical with the acceleration of either resting or slowly moving air masses, the author observes a reduced velocity along the curved part of a wave path as compared with the straight wave path; this is particularly evident in cyclone curvature (trough aloft) but less marked in the anticyclonic (ridges aloft). An analysis of various examples of such accelerations and retardations obtained from American radiosonde data is presented. Synoptic charts showing the various examples are included. *Subject Heading:* 1. Jet stream turbulence. —*I.L.D.*

VERTICAL MOTION

See also: **Lee wave effects on glider flights**, 11.7–79; **Nongeostrophic wind flow** (Kurbatkin), 11.7–274; **Convective heat exchange** (Krishnamov, Iordanov), 11.7–305.

11.7–330 551.558:533.16

Elliott, William P. (*Dept. of Oceanog. & Met., A & M College of Texas*). **Growth of the atmospheric internal boundary layer.** *American Geophysical Union, Transactions*, 39 [6]:1048–

1054, Dec. **1958.** 5 figs., 11 refs., 21 eqs. **DWB, DLC**—When air, whose wind profile is in equilibrium with an underlying surface, passes to another surface with different roughness, a layer is formed in which the air has adjusted to the new surface. Generally this layer will grow in depth downwind. Assuming the logarithmic wind-speed distribution and Kármán's integral equation the height of this layer is computed theoretically as a function of distance. A dimensional argument is also presented which qualitatively confirms the result that the boundary layer grows as the 4/5 power of the distance downwind and is independent of wind speed. The effect of thermal stability is estimated and found to be relatively small, raising the height of the layer in lapse conditions and lowering it in inversions. Some data are discussed which qualitatively confirm those results but which cannot be considered to be conclusive. *Subject Headings:* **1. Boundary layer theory 2. Vertical wind profiles.** —*Author's abstract.*

11.7–331 551.558 551.508.54:551.596.1

Panofsky, H. A., **The spectrum of vertical velocity.** Wisconsin Univ. Dept. of Meteorology, Contract AF 19(604)-1384, Final Report, Aug. 31, **1958.** p. 45–56. 3 figs., 7 refs., 6 eqs. **DWB**—A comparison is made between MIT and Wisconsin spectra for O'Neill, Neb. Wisconsin spectrum is graphically shown (Fig. 1), and discrepancies with MIT spectrum are noted. It is found that the spectra obtained by the two groups are definitely consistent. All vertical velocities obtained by sonic anemometer are averaged over one meter and the resultant effect is considered. A hypothesis is advanced regarding the shape and position of the vertical velocity spectrum. To indicate that the hypothesis is tenable, vertical-velocity spectra are brought together (Fig. 2) from a considerable number of sources, viz., SHIOTANI (1956), CHARNOCK and ROBINSON (1957), MCCORMICK (unpublished), etc. Qualitative use was made also of a spectrum published by CHARNOCK and ROBINSON. The treatment of individual data is also summarized. Finally, the magnitude of the vertical-velocity spectra is considered and mathematically and graphically (Fig. 3) worked out. It is concluded that theoretically, the vertical variation should be large with small stress and with large heat-flux. *Subject Headings:* **1. Vertical wind velocity spectra 2. Sonic anemometers.**—*I.S.*

11.7–332 551.558.1:551.591.3

Kargol, F. M., **Convection as an indirect cause of deterioration at Ternhill on April 29, 1958.** *Meteorological Magazine*, London, 88(1039):20–22, Jan. **1959.** table, 2 figs. **DWB, DLC**—From the conditions given no apparent reason is found for the wind shift which was followed by deterioration in visibility. After the first deterioration, lasting 2 hrs, conditions became normal until 1450 G.M.T. when temperature reached 62°F and recurrence followed. Both occasions were marked by a temperature drop of 4°F. A reasonable conclusion of replacement by sucked in cooler air of the convection-lifted air may explain the phenomenon. *Subject Headings:* **1. Convection currents 2. Visibility decadence 3. Ternhill, Eng.**—*W.N.*

11.7–333 551.558.1:551.576.1

†Newton, Chester W. and Newton, Harriet Rodebush (*both, Chicago Univ.*), **Dynamical interactions between large convective clouds and environment with vertical shear.** *Journal of Meteorology*, Boston, 16(5):483–496, Oct. **1959.** 14 figs., table, 34 refs., 8 eqs. **DWB, DLC**—The physics of convective clouds depends not only upon thermodynamic processes but also upon the interactions with the environmental wind field. When vertical shear is present, a hydrodynamic (nonhydrostatic) pressure field is induced by relative motions near the boundaries of a large convective system which does not move with the ambient winds. This tends to make the cloud tilt away from the vertical, but at the same time vertical gradients of hydrodynamic pressure aid the formation of new convection. Expressions are derived for the accelerations concerned. Quantitative estimates based upon experimental analogies show that vertical accelerations due to the induced pressure field may be of the same order as those associated with ordinary buoyancy forces. These account for the self-propagating nature of squall-line-type thunderstorms and their ability to continue at night when thunderstorms in stagnant air masses tend to die out. The hypothesis accounts for the observed movements of this type of rainstorm, somewhat toward the right of the winds in the convective layer, and

is consistent with the preference of severe phenomena, such as tornadoes, for a particular flank of a rainstorm. Distinction is made between large and small clouds as affected by shear. *Subject Headings:* **1. Convective clouds 2. Vertical wind shear 3. Wind shear effects on convective clouds.**—*Authors' abstract.*

11.7–334 551.558.1

Parczewski, Władysław, **Etude sur les courants thermiques verticaux.** [Study of vertical thermal currents.] *Acta Geophysica Polonica*, Warsaw, 6(2):153–162, **1958.** 4 figs., 4 refs. Polish summary p. 162. **DLC.** Also: Russian version as **Issledovaniia termicheskikh vertikal'nikh potokov.** *Meteorologiia i Gidrologiia*, Leningrad, No. 5:26–29, **1958.** 2 figs., 4 refs. **DWB, DLC**—A study of vertical currents arising under individual clouds or groups of clouds, of vertical development of currents developing within clouds and also of analogous vertical currents not attaining the level of condensation. This study is based upon sail plane observations. Thermal vertical currents in the troposphere constitute two groups depending on the manner in which unstable equilibrium is attained. When the air reaches unstable equilibrium as a result of secondary processes accompanying the heating of the earth's surface by the sun the intensity, frequency and extent of vertical currents and time of origin depend upon the amount and daily variation of incoming solar energy. The development of such currents was investigated during the warm season in areas of high pressure or in areas of not very deep low pressure, with slight horizontal pressure gradients, in which cloudiness, except for cumulus and cumulonimbus clouds, is absent. Vertical currents arise as independent streams terminating at cumulus or cumulonimbus clouds. The decrease in solar warming by high level clouds or cumulus or cumulonimbus clouds may completely reduce the velocity of the currents or even suppress them. At the earth's surface the vertical currents consist of chaotic air currents of small dimension which coalesce at 100–200 m into complex ascending currents. The horizontal extent of insolation currents (under clouds) may range from 100 m to several kilometers. In the interior of clouds the velocity of ascending currents increases slightly, but an internal nucleus with larger ascending velocities greater than in the rest of the current may arise. Vertical currents are most intense when flow of cold air over warm air is accompanied by intense solar heating of the earth's surface. Descending currents between cumulus clouds were weaker than under the base of such clouds; their velocity was usually less than that of ascending currents, except in cumulonimbus clouds. The results of observations obtained within cumulonimbus clouds by means of sail planes are summarized, namely: unusually intense turbulence was observed along the edges of clouds and also within clouds at the margin of collision of ascending streams with streams of currents ascending in the anterior part of the cloud and descending in the rear part; in the developmental state corresponding to a thundercloud the velocity of all currents increases simultaneously with increase of height, reaching a maximum in the upper parts of the cloud; with approach to anvil type cloud turbulence is unusually strong; and at 3–4 km ascending air is several degrees warmer than descending air so that in ascending currents the 0°C isotherm is 200–300 m higher in descending air of a cumulonimbus cloud. *Subject Headings:* **1. Vertical currents 2. Thermals.**—*I.L.D.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROLOGY

HUMIDITY

See also: **Humidity measurement in gymnasia** (Vytchikova), 11.7–107; **Humidity measurement** (Troeger), 11.7–234; **Shelter belt effects on humidity** (Zakiev), 11.7–321; **Water vapor-temp.-precip. relationships** (Arakawa), 11.7–362.

11.7–335 551.571

Iudin, M. I. and Ledneva, K. V., **Strukturnaia funktsiia polia absoliutnoĭ vlazhnosti.** [Structural function of the absolute humidity field.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 71:156–162, **1957.** 3 figs., 3 tables, ref., 3 eqs. **DWB** (M(055)

U581tG)—The structural function of the field of absolute humidity $B(l)$ was determined by the formula

$$B(l) = (e_1 - e_2 - \bar{e}_1 - \bar{e}_2)^2$$

where e_1 and e_2 = values of absolute humidity at two stations at a distance of l and $\bar{e}_1$, and $\bar{e}_2$ = mean monthly values of absolute humidity at these points for a given year. Calculations were made for 19 weather stations in European U.S.S.R. for 13 o'clock. Three year means of the structural function smooth out considerably irregular variations for individual years. For individual periods, April and July $B(l)$ manifest a linear relationship for $l = 600$–800 km; but in general the dispersion is quite large. $B(l)$ is directly proportional to the saturation humidity E; the latter is determined from the mean temperature of two stations for the entire period. From coastal-continental station pairs it was found that the annual variation of the structural function is described almost completely by the proportionality $B(l) \sim E$ so that $B = (0.06 + 5.5 \times 10^{-7} l)E$; the "initial ordinate" 0.06 E is a quantity determined by errors of humidity measurement and microclimatic differences of the localities. The relationship of the structural function to the distance of stations in essentially different humidity condition is given by

$$B = (0.10 + 6.2 \times 10^{-7} l)E.$$

The first power law fully describes the dependence of the structural function of the absolute humidity field upon distance for values up to $l = 700$–800 km. For larger distances the function remains approximately constant since the dispersion increases. *Subject Heading:* **1. Absolute humidity field.**—*I.L.D.*

11.7–336 551.571.3:551.510.42:621.395.34

Rossing, Harvey C. (*A. T. & T., N. Y.*), **Ventilation for telephone exchanges.** *Air Conditioning, Heating and Ventilating*, N. Y., 56(8):59–61, Aug. **1959.** 2 figs. **DWB, DLC**—The control of humidity and dust has been studied by the Bell Telephone laboratories for the best operating environment for automatic telephone switching equipment. In this article a discussion of each of the following is given, viz: the effect of humidity, the limits of relative humidity during the summer and winter, the improved equipment, and the means whereby the dust is filtered. The necessary ventilation conditions and the use of a new tool for dust evaluation are described. *Subject Headings:* **1. Humidity control 2. Dust prevention 3. Telephone exchanges.**—*N.N.*

11.7–337 551.571.7:551.508.822(988)

Wilson, Richard Keith, **An attempt to measure the water vapor divergence over Greenland by direct application of radiosonde data.** Washington (State). Univ. Dept. of Meteorology and Climatology, Contract AF 19(604)-3063, Scientific Report, No. 3, May **1959.** 38 p. 7 figs., 6 tables, 17 refs., 16 eqs. **DWB**—The purpose of this report is to attempt to measure the water vapor divergence over Greenland by the direct application of radiosonde data. The calculation of reliable water vapor divergence over Greenland would improve the existing water mass balance estimates of the island. The Water Vapor Transport Project, conducted by the Johns Hopkins University and directed by GEORGE S. BENTON, made use of a series of analyzed charts to compute the water vapor divergence over the North American continent in 1949(3). The geostrophic winds and reported dew points at designated radiosonde stations were directly applied to the mean water vapor flux and water vapor divergence equations. The same procedure is used in this report with the exception of the use of observed radiosonde winds instead of geostrophic. The diversified opinions about the water-mass balance of Greenland gives an ideal testing site for this method, the procedure of which will be described in a later section. Because of Greenland's climatic conditions, only the coastal areas are inhabitable, resulting in little being known about the meteorological processes of the icecap. Scientific expeditions onto the interior ice have been infrequent until the last decade, during which time considerable data have been gathered. For this reason, the author will present a resume of the geographical, topographical, and hydrological features of Greenland, which must be used in the evaluation of the results of water vapor divergence computations. *Subject Headings:* **1. Water vapor divergence calculation 2. Radiosonde data 3. Greenland.**—*Author's introduction.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **Evaporation of aircraft fuel** (Lowell), 11.7–77; **Evaporation bibliogs.** (Miller), 11.7–363; **Evaporation calculations** (Szepesi), 11.7–367.

11.7–338 551.573:628.13

La Mer, V. K. (*Dept. of Chem., Columbia Univ.*), **Retardation of evaporation by monolayers.** *International Congress of Surface Activity, Proceedings of the 2nd Congress*, issued N. Y., Academic Press, **1957.** p. 259–261. 4 refs. Also: McArthur, I. K. H. (*Price's Ltd., Bromborough Pool*), **Fatty alcohols for water conservations.** *Ibid.*, p. 262–269. fig., 8 tables, 12 refs. Also: Grundy, F. (*East African Met. Dept., Nairobi, Kenya*), **Reduction of evaporation from reservoirs.** *Ibid.*, p. 270–274. 2 eqs. Discussion of these three articles, p. 275–280. **DLC** (QD506.W6)—In the first article the influence of the molecular architecture on the retardation and permeability of films is examined by studying the rate of evaporation in terms of the temperature dependence and state of compression of the films. A modification of the Langmuir method of film spreading is introduced, using a highly volatile substance under an initially high surface pressure. In the second article it is shown that laboratory trials have demonstrated that commercially available blends of stearyl and cetyl alcohols generate films that exhibit greater evaporation resistance than films from relatively pure cetyl alcohol. The spreading rate and film recovery power of such a blend can be improved by incorporation of 5 to 8% oleyl alcohol, and a certain alcohol together with 5–8% oleyl alcohol represents the most efficient type for water conservation as it yields films with high evaporation resistance, rapid spreading and good recovery characteristics. Small beads give rapid spreading when their surfaces are crystalline, but most efficient spreading occurs from solution or when powder is used. Article number three deals with the development of a method by the East African Meteorological Department of using cetyl alcohol to reduce evaporation losses from reservoirs by a solution of the material in kerosene (paraffin oil) with the addition of a small amount of a spreading agent. The success of this method depends on the movement of drops of solution over the water surface by wind. The methods of applying the solution in various field experiments are described, as well as the computations to determine the reduction in evaporation from reservoirs. The experiments were carried out in unfavorable weather conditions, but the experience and the results obtained indicate that the methods used are both practicable and successful. *Subject Headings:* **1. Evaporation reduction 2. Water supply 3. Evaporation from reservoirs.**—*Authors' abstracts.*

11.7–339 551.573:551.551:551.571

Mysels, Karol J. (*Univ. of Southern Calif., L. A.*), **On evaporation from wind-swept surfaces.** *Science*, Wash., D. C., 129(3340):38–39, Jan. 2, **1959.** fig., 5 refs., 7 eqs. **DLC**—Evaporation is analyzed in terms of resistances and driving forces for the coupled flows of vapor and heat. The conditions and assumptions under which all resistances can be determined independently are discussed, and preliminary experiments are reported. The effect of a monomolecular layer upon the transport of vapor is thus measured on a wind-swept surface, and its effect upon heat transport in the water is indicated. *Subject Heading:* **1. Evaporation from wind-swept surfaces.**—*Author's abstract.*

CONDENSATION

See also: **Icing of aircraft** (Dickison), 11.7–72; **Icing of aircraft** (Zavarina), 11.7–73.

11.7–340 551.574.1:551.578.71(712.3)

McGill Univ. Macdonald Physics Lab. Stormy Weather Research Group, **Alberta hail, 1958 and related studies.** Contract AF 19(604)-2065, Scientific Report MW-30, July **1959.** 64 p. Contents: Douglas, R. H., **Alberta Field Studies,** p. 1–28. 5 figs., 5 refs. Douglas, R. H., **Growth by accretion,** p. 29–42. 4 figs., 17 refs. Barklie, R. H. D. and Gokhale, N. R., **Freezing of supercooled water drops,** p. 43–64. 11 figs., 2 tables, 9 refs. **DWB** (M94.2 M145s)—The experimental approach to the study of the freezing of supercooled water drops, described here, is based on an analysis of the problem made by T. S. Marshall in 1958. Pt. I of this report contains an analysis of the radar and hail data collected in Alberta in the

summer of 1958, and also further analysis of the 1957 data. The analysis was carried out during the winter in the laboratories of the Stormy Weather Group at McGill University. Pt. II is a quantitative study of ice particle growth, basic to a further understanding of the mechanism of hail formation. Pt. III describes an experiment to test the nature of the freezing process of small water drops. Results to date substantiate that freezing is a time-dependent random process that applies to drops of any purity. The study is extensively illustrated by graphs. *Subject Headings:* **1. Freezing of supercooled water 2. Ice nuclei formation 3. Hail 4. Alberta, Canada.**—*I.S.*

11.7–341 551.574.11:546.621:546.49

De Bernochi, Cesare, **Sull'efficienza di una particolare sostanza nucleante studiata anche dal punto di vista elettrico.** [A study of the efficiency of a particular nucleating substance including its electrical aspects.] *Geofisica e Meteorologia*, Genoa, 6(3/4):37–42, **1958.** 4 figs., 6 refs., 8 eqs. Italian and English summaries p. 42. **DLC.** Also issued in: *Simposio Internazionale sulla Fisica delle Nubi e Relative Applicazioni all'Agricultura, Asti, Italy, April 1958, Atti*, issued Dec. **1958.** p. 25–36. 4 figs., 6 refs. Italian, French, English and German summaries p. 36. -The new nucleating substance, whose physical and chemical properties are described, is an oxide of aluminum combined with mercury, having the formula Al_2O_3Hg. As a result of interfacial processes, minute water droplets are formed at the points of contact with aluminum and mercury. When a particle of this substance is in suspension in the atmosphere, the droplets increase in size and coalesce to form a droplet with Al_2O_3Hg as its nucleus. The substance is in a state of extreme subdivision, with the diameters of the particles ranging between 0.8 and 5 microns. In 1 kg of substance there are estimated to be 75×10^{12} condensation nuclei. The water content of the nuclei is as much as 40.59%. The energy of transformation of a nucleus into a condensation nucleus is analyzed with the aid of relevant equations and it is shown that the dimensions of the particles of Al_2O_3Hg are of the minimum compatible with efficient functioning under the degree of supersaturation occurring under natural conditions. The substance was found to function as a freezing nucleus at a temperature range of 0°C and −40°C for particles having dimensions of 2.56 and 3 microns. The resistivity of the substance in powdered form between −20° and +20°C indicates the water content of the substance and is a minimum for temperatures 12° to 25°C when the water content is a maximum; at 0°C the resistivity curve passes through the known value of the resistivity of ice, indicating that the water of the substance freezes so that freezing nuclei are present. The determination of relative humidity in closed surroundings with a constant and non-saturated quantity of air in the presence of this substance, seeding an open environment at a positive temperature and in a supersaturated state and at a negative temperature and a supersaturated state with this substance; the behavior of Al_2O_3Hg in a radioactive state and the practical utilization of this substance are discussed. *Subject Headings:* **1. Nuclei effectiveness 2. Aluminum oxide nuclei.**—*I.L.D.*

11.7–342 551.574.11:537.525

Nolan, P. J. (*Univ. College, Dublin*), **Small nuclei produced by discharge at a point.** *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued **1958.** p. 17–20. 6 refs. **DWB** (M(055)C748pr)—Very small uncharged nuclei are produced by electric discharge at a point. By measuring the size and supersaturation required for condensation it is found that the nuclei behave as if composed of a solution with a vapor pressure 15% less than that of pure water. The radius 10 sec after formation is of the order 1×10^{-7} cm. The nuclei increase in size and in heterogeneity with time. Near the point there is an intense concentration of nuclei which are mainly uncharged. Since the field is not uniform there is a force of each nucleus driving it towards the point. Experimental evidence for this effect has been obtained. *Subject Headings:* **1. Small nuclei 2. Nuclei sources.**—*Author's abstract.*

FOG

11.7–343 551.593.9:551.575.5(988)

†Reiquam, Howard and Diamond, Marvin, **Investigations of fog whiteout.** *U. S. Snow Ice and Permafrost Research Establishment, Research Report 52*, July **1959.** 18 p. fig., 3

tables, 35 refs., 3 eqs. **DWB, DLC**—The results of studies on the physical properties of fog whiteout, as it occurred at Site 2 on the Greenland Ice Cap in the summers of 1956 and 1957, are reported and compared with the results of other studies; the instruments, methods of measurement, and data-reduction techniques used are described; and attempts at dissipating whiteout by AgI seeding are discussed briefly. Emphasis was given to measurements of fog-particle size distribution, liquid-water content, relative humidity, visibility, and atmospheric nuclei. The data are tabulated. The synoptic situations for 2 selected cases of fog whiteout at relative humidities of less than 100% (possibly because of the presence of salt solutions) are described; and the balance between the rate at which water is made available in the air as it is lifted over the Ice Cap and the rate of water flux to the snow surface is computed using various equations. Efforts at fog dispersal by AgI seeding from the ground were inconclusive. *Subject Headings:* **1. Polar whiteout 2. Greenland Ice Cap.**—*Authors' abstract.*

11.7–344 551.575.5(261)

Shirley, J. A. (*Marine Observ., U. S. W. B.*), **Steam fog or sea smoke.** *Mariners Weather Log*, Wash., D. C., 3(5):180–181, Sept. 1959. fig. **DWB**—Correct classification, using Form 615-5, of steam fog encountered by S/S "J. W. van Dyke" enroute Philadelphia, Pa. to Venezuela Jan. 5, 1959 is described here. The illustration is accompanied by the meteorological data. *Subject Headings:* **1. Steam fog 2. North Atlantic.**—*W.N.*

11.7–345 551.575.5(494.4)

Urfer, Alfred (*Zurich 58 Airport, Switz.*), **Un cas particulier de brouillard en Valais** [A peculiar type of fog in Valais.] *La Wurithienne: Société Valaisanne des Sciences Naturelles, Valais, Switzerland, Bulletin*, 70:25–36, 1953. table, 15 refs. **DLC**—A statistical study shows the percentage of fog at the bottom of the Rhone Valley in central Valais (Sion) to be small. An analysis based on theoretical considerations leads to the hypothesis that four types of fog can form in the region. The author further demonstrates the existence of radiation fog which is preceded by moist air advection from the Lake Constance region, undoubtedly connected with the valley wind which forms under certain meteorological conditions. *Subject Headings:* **1. Fog formation 2. Radiation fog, Valais, Switzerland.**—*Transl. of author's abstract.*

CLOUDS

See also: **Convective clouds-vertical shear relationships** (Newton, Newton), 11.7–333; **Elec. of clouds** (Chalmers), 11.7–396.

11.7–346 551.576(267) 551.576.1:551.553.21:551.557.5

Sharp, F. A., **Cloud over the open sea.** *Meteorological Magazine*, London, 87(1033):202–204, July 1958. 3 tables, ref. **DWB, DLC**—Diurnal variation of cloud was investigated. Surface charts at Changi 1955 and ship reports from Ceylon and the northern tip of Sumatra but extending northward to the Bay of Bengal and southward toward the equator were analyzed and the results tabulated. The tables feature: (1) average amount of low clouds, (2) frequency distribution of cumulonimbus and (3) average amount of total cloud. It is shown that of the 3,649 cases of clouds analyzed, 118 were cumulonimbus, of which only 48 cases may be said to be representative for a completely covered sky. Any diurnal variation of clouds over open sea must be due to adjacent land. Convergent low level flow is exceptional. Presence of extensive cirrus sheets during S-W monsoon may be associated with an eastern jet stream. *Subject Headings:* **1. Cloudiness at sea 2. Jet stream clouds 3. Monsoon clouds 4. Indian Ocean.**—*W.N.*

11.7–347 551.576.1:629.135.2:77.092(42)

Poulter, R. M., **Weather 1958 photographic competition prizewinner.** *Weather*, London, 14(4):139, April 1959. photo p. 137. **DWB, DLC**—Prize was given for a photo of a contrail taken behind a cold front on Feb. 24, 1949, from Farnborough (Hants). The tropopause was at 36,700 ft, temperature −81°F, and wind at 34,000 ft was 279°, 80 kt. The right hand por-

tion of the contrail is very much dispersed whereas most of it is intact. *Subject Headings:* **1. Contrail photographs 2. Farnborough, Eng.**—*M.R.*

11.7–348 551.576.11:551.576.2(584.6)

Gal'perin, I. A., **Neobychnaia oblachnost'.** [Unusual cloudiness.] *Priroda*, Moscow, No. 11:110, Nov. **1958. DLC** -A description of unusual cloudiness observed on March 26, 1956 on southern Lake Balkhash (at the mouth of the Ili River). While the sky was covered with cirrus and cirrocumulus clouds, a billowy cloud appeared suddenly on the western horizon and rapidly approached at a height of 50–75 m above the surface of the earth. Its color was bright gray; it had sharply defined upper contours. When the axis of the cloud extended from horizon to horizon to a NNW and SSE direction it covered more than half of the sky. It moved rapidly in an ESE direction. Six such billow clouds passed across the sky. Before the appearance of the billow clouds the pressure began to rise at a rate of 0.5–0.8 mb/hr; during passage of the billow the pressure, which amounted to 974.6 mb, rose suddenly by 2.6 mb then fell to the initial value; it rose anew by 2.6 mb at the passage of the second billow and similarly for the other passages. Before passage of the billow clouds the wind direction was SSW at 1 m/sec; at the approach of the first billow the wind speed rose to 15 m/sec and the direction changed to that of the movement of the clouds. Between 0300 and 0500 o'clock the temperature ranged between 1.6° and 1.1°C but on approach of the first cloud it fell by 0.3°C and immediately began to rise, attaining 1°C in 5½ min. An increase in relative humidity by 1% corresponded with the fall in temperature. *Subject Headings:* **1. Cloud systems 2. Cloudiness data 3. Lake Balkhash, Kazakh S.S.R.**—*I.L.D.*

11.7–349 551.576.2(438)

*Michna, Edward, **Zachmurzenie Przemyśla.** [Cloudiness at Przemyśl.] *Lublin. Uniwersytet Marii Curie Sklodowskiej, Annales, Sec. B*, 12:201–220, **1957,** issued **1959.** 6 figs., 6 tables, 13 refs. German and Russian summaries p. 219–220.—An article dealing with: a) the characteristics of cloudiness at Przemyśl and environment; b) the analysis of the different observed cloud types. Observations made during the period 1947–1956 at the Hydrological-Meteorological Inst. of Przemyśl were used. Analysis of statistical material shows: 1) the highest percentages of cloudiness correspond with the cold periods of the year (a maximum of 77% in November, Sc, St and Ac) under influence of polar maritime and polar-continental air and of the Carpathian mountains; 2) a lower nebulosity value during summer, spring and autumn, with a minimum (50%) for August–September. The summer period shows a high frequency of Ci clouds; the highest number of clear days is found during autumn and winter. The maximum of fine weather days is in Sept., the minimum in Nov. At Przemyśl Sc, Ac, Cu, Ci and St Clouds have the highest percentages (20.7, 15.6, 13.3, 13.0, 11.5%); Cs and Cc the lowest ones (2.2 and 0.4%). A comparison is made between the characteristics of cloudiness at Przemyśl and other Polish towns. *Subject Headings:* **1. Cloudiness data 2. Seasonal cloudiness variations 3. Air mass effects on cloudiness 4. Przemyśl, Poland.**—*A.V.*

PRECIPITATION

See also: **Rainfall-runoff relationships, 17th century, France** (Dooge), 11.7–54; **Sec. F3,** p. 1066; **Rainfall frequency determination** (Russak, Easley), 11.7–235; **Rainfall measurement** (Levert), 11.7–261; **Rainfall distribution, Ardèche, France** (Guilhot), 11.7–364; **Rainfall charts, Queensland** (Coaldrake, Bryan), 11.7–373.

11.7–350 551.577(569.4)

Katsnelson, J., **Rainfall in Israel.** (In: Israel. Meteorological Service, **Book of ten years of the Meteorological Service of Israel.** Tel Aviv, **1958.** p. 37–52. In Hebrew.) **DWB** (M(06) I85se)—The article summarizes the information concerning rainfall in Israel. It attempts to clarify certain basic concepts as well as to point out errors commonly made by the public. The arrangement of the material is as follows: 1. Rainfall by area; 2. Rainfall by period; 3. Rainfall extremes annually and by month and its relation to the problem of drought; 4. The intensity of rainfall and its relation to the problem of flooding. *Subject Headings:* **1. Rainfall data 2. Israel.**—*I.S.*

11.7–351 551.577.37:551.515.4(689)

Symmons, P., **Rainfall patterns at Abercorn, Northern Rhodesia.** *Weather*, London, 13(8):272–275, Aug. **1958.** 3 figs., 2 tables, 4 refs. **DWB**—Purpose of this study was to check origin, duration, intensity and regularity of the prevailing rainstorms of thunderstorm type in Central Africa. Rain gage records from the remote area at Abercorn, Hq. of the International Red Locust Control Service, as taken during the rainy season (Oct. through May, 1954–57) were analyzed. The results discussed are presented in graphs featuring: 1) Rainfall in in.; 2) Duration of rainfall in hr; 3) Rainfall intensity in in./hr. Tabulated data show duration of storms shorter than 1 hr, 1–2 hr, 2–3 hr, and longer than 3 hr. Sequence of rainy days is given. It is shown that 56% of the average annual rainfall occurs between 11 a.m. and 7 p.m., a pattern which is similar when considering the mean total for the season of intensity and duration of storms. It was found that rain may fall at any hour and more intense between 11 a.m. and 7 p.m. If storms are of convectional origin, they would be the short-lived afternoon showers rather than the long-lived storms. *Subject Headings:* **1. Rainfall analysis 2. Rainstorms 3. Abercorn, Northern Rhodesia.**—*W.N.*

11.7–352 551.577.2:551.577.51 551.588.2(477)

Fel'dman, Ia. I., **Rol' ravninnogo rel'efa i pribrezhnykh nizmennosteĭ v obrazovanii mestnoĭ pogody.** [Role of plain relief and coastal lowlands in the formation of local weather.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 1:82–85, Jan./Feb. **1959.** table, 9 refs. **DWB**—On the basis of meteorological data from 8 stations in two different physiogeographical regions (central and southern Ukraine), the author investigated the influence of plain-relief upon the frequency of different types of weather and upon the intensity of individual cases of precipitation during the summer months of June–August. The dissection of the relief of the Russian plain helps to increase both rainy weather of frontal origin and weather with convective cloudiness by day. However, the formation of rain weather is influenced only by the contrast in the degree of dissection of large regions while the formation of cloudy weather by day and the intensity of precipitation during this weather depends upon local differences in dissection. The coastal areas of the Black Sea lowlands in southwestern Ukraine have lower frequencies of rainy weather and weather with cloudiness by day than more distant areas because of the sea breeze inversion and the stability of atmospheric flow from the sea. The intensity of precipitation during rainy weather along the coast is greater than at a distance from the sea. In spite of the increase in precipitation and cloudiness with distance from the sea, the frequency of sukhovei drought weather increases also in the same direction since the effect of the nearness of the sea upon temperature and air humidity is greater than the effect of increase of precipitation. *Subject Headings:* **1. Topographic effects on rainfall 2. Rainfall distribution 3. Ukrainian S.S.R.**—*I.L.D. and author's conclusions.*

11.7–353 551.577.21:551.577.38:632.112(43)

Pfau, Rolf (*Deutscher Wetterdienst Offenbach/M*), **Die Folgen des trockenen Sommers.** [Results of the dry summer.] *Umschau*, Frankfurt a.M., 23(59):705–708, Dec. **1959.** 3 figs. German summary p. 705. **DLC**—The moisture available to plants during the growing season of 1959, which was characterized by drought, is analyzed from the point of view of water balance-precipitation, evapotranspiration, available moisture in soil and field capacity. The rainfall amounts that fell in Germany during the vegetation period (April 1 up to the end of April), June, July, August and September are discussed with the aid of a map showing the rainfall in percent of the normal amount. The moisture requirements for evaporation were determined and the time at which clayey and sandy soils attain the critical threshold value of 30% of usable field capacity was determined. The distribution of the water capacity during the individual months is shown on maps. In case of north Germany the drought period in June signifies damage to grain crops on light soil, in July damage to fruit on light soil and in August and September partial damage to fruit on heavy soil. In central and south Germany severe desiccation occurred with the beginning of the late summer drought. In this area where medium and heavy soils predominate, grain crops had sufficient moisture from April to mid-July. The drought affected here fruit whose water supply becomes important around mid-July. From the condition prevailing at the end of September it is estimated that 80–130

mm of water is required in order to provide the 0–60 cm soil layer with sufficient moisture for favorable growth in the spring of 1960. This amount is less than the average effective deficit of precipitation against the normal which in north Germany is 180–230 liters/m² and in the rest of Germany varies between 80 and 180 liters/m². *Subject Headings:* **1. Precipitation deficiency 2. Soil moisture requirements 3. Drought effects on crop yield 4. Germany.**—*I.L.D.*

11.7–354 551.577.37:551.515.2(528.3)

Jordan, C. L. (*Florida State Univ.*) and Shiroma, Michio (*Ryukyu Weather Bureau*), **A record rainfall at Okinawa.** *American Meteorological Society, Bulletin*, 40(12):609–612, Dec. **1959.** 4 figs., 9 refs. **DWB, DLC** —A maximum rainfall of 38 in. was recorded during an 18-hr period as a typhoon passed over the island of Okinawa in Sept. 1956. The observed weather conditions during the typhoon passage are discussed in relationship to the observed rainfall distribution on the island and some comments are offered on the problems of evaluating the reliability of measurements of very heavy rainfall. *Subject Headings:* **1. Record rainfall 2. Typhoon precipitation distribution 3. Okinawa.** —*Authors' abstract.*

11.7–355 551.577.38:551.579.5(755)

Van Bavel, C. H. M. and Lillard, J. H. (*both, U. S. Dept. Agriculture*), **Agricultural drought in Virginia.** *Virginia. Agricultural Experiment Station, Blacksburg, Technical Bulletin*, No. 128, April **1957.** 38 p. 33 figs., 4 tables, 6 refs. **DWB** (M77.38 V817ag) —The primary purpose of this bulletin is to project the probability of droughts throughout Virginia based on past climatic records. Since drought occurrence depends upon the soil moisture holding capacity of the root zone, the real drought hazard can be described only in terms of soil moisture storage and of acceptable odds. The 4 drought occurrence odds and the 5 root zone soil moisture capacities used in this study were selected to encompass most Virginia conditions. All of the data are presented in figures and tables for the various combinations so that the user can select the information which most nearly meets his requirements. *Subject Headings:* **1. Drought probability 2. Soil moisture retention 3. Virginia.** —*Authors' abstract.*

RAIN, SNOW AND HAIL

See also: **Snowplows** (Eventov), 11.7–5; **Sr^{90} in rainwater** (Miyake et al.), 11.7–116; **Snow survey data, Montana and Wyoming,** 11.7–221; **Shelter belt effects on snow cover** (Kopanev), 11.7–319; **Hail, Alberta,** 11.7–340.

11.7–356 551.577.51:551.588.2(234.5)

Weinländer, August (*Ottobrunn bei München*), **Niederschlag und Geländegestaltung.** [Precipitation and topography.] *Meteorologische Rundschau*, Berlin, 12(4):120–126, July/Aug. 12 figs., 2 tables, 2 refs. **DWB, DLC** In general the influence of topography only rarely manifests itself uniformly over a large area; over longer periods, however, the meteorological randomness equalizes itself and the influence of topography appears clearly. The results of a detailed study on the effect of topography upon precipitation carried out during 1928–1936 at the Grosser Arber in the Bohemian Forest in Bavaria, where a special precipitation network was established, are analyzed. The total precipitation of the Arber region and also that of other mountains consists of the principal precipitation and of supplementally produced warm and cold front precipitation. In the case of high mountains another portion of the precipitation is the shower and thunderstorm precipitation produced locally by the sun, since the production energy for this precipitation is lower on plateaus and therefore these forms of precipitation occur more frequently. While other theoretical considerations are not considered in this study it is not unimportant whether the atmosphere is elevated 500–700 m or 1000–1200 m above the ground surface. In spite of the various limitations, the totalizer on the Arber peak recorded an annual average of 1813 mm while the monthly totalizer 100–150 m farther east and 30 m lower showed an annual mean of 1717 mm or 100 mm less. This difference is regarded as not absolutely improbable. The application of the method described here to further studies of the relationship between precipitation and topography is discussed. *Subject Headings:* **1. Topographic effects on rainfall 2. Arber Mt., Bohemian Forest, Bavaria.** —*I.L.D.*

11.7–357 537.311:551.578.1:551.594.253

Mukherjee, Asoke Kumar (*Met. Office, Barrackpore*), **Electrical conductivity of Nor'wester rain water.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(4):425–434, Oct. 1959. 5 figs., 2 tables, 12 refs., 9 eqs. **DWB, DLC**—Electrical conductivity of samples of rainwater from some pre-monsoon thundershowers were measured. It is observed that conductivity gradually decreases with the progress of rain, passes through a minimum and rises again towards the end. It is also noticed that during the period of its rise, conductivity shows an inverse relationship with the intensity of rain of the form $K\alpha I^{-n}$ where n is a positive fraction. The conductivity of rainwater towards the end of a thundershower may be higher than that in the beginning. The time variation conductivity has been explained by considering (a) the dissolution of pollutants in cloud droplets in cumulus stage, (b) the addition of pollutants to rain by washing out mechanism, (c) concentration of pollutants in droplets formed in the updraught and (d) introduction of environmental air in the cloud field at the dissipating stage. *Subject Headings:* **1. Electrical conductivity over thunderstorms 2. Electricity of precipitation.**—*Author's abstract.*

11.7–358 551.578.46(234.9)

Khmaladze, G. N., **O snegos ĕmkakh v gorakh Kavkaza.** [Snow surveys in the Caucasus Mountains.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:77, April 1959. **DWB, DLC**—During Dec. 18–20, 1958 the Tiflis Scientific Hydrometeorological Institute conducted a meeting of snow surveyors of the Transcaucasian republics of Azerbaidzhan, Armenia and Georgia. Brief mention is made of some of the more important papers presented. These included a report on avalanches in the Greater and Lesser Caucasus during the period 1933–1958 (G. N. KHMALADZE); water storage in snow at the principal elevation zone of 1800–2400 m (A. A. POGOSIAN), etc. *Subject Headings:* **1. Snow surveys 2. Caucasus.** *-I.L.D.*

11.7–359 551.578.46(234.3)

Poggi, André, **Contribution à la connaissance de la distribution altimétrique de la durée de l'enneigement dans les Alpes françaises du Nord.** [Contribution to knowledge on the distribution of snowpack with height in the northern French Alps.] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):134–149, 1959. 11 figs., 4 tables, 10 refs. French, German and English summaries p. 134. **DWB, DLC**—After defining the duration of the snowpack (snow cover), the laws concerning the distribution of the snowpack as a function of altitude for several zones of the northern French Alps are established and justified. In the second part, the results are compared and an attempted interpretation is presented. In the last part, the laws determined in the first part for altitudes less than 2000 m are extrapolated for higher altitudes. *Subject Headings:* **1. Snow cover distribution with elevation 2. French Alps.**—*Author's abstract.*

11.7–360 551.578.46:551.524(234.5)

Vitásek, Frantisĕk (*Brünn*), **Zur Höhenlage der Schneegrenze in Mitteleuropa.** [Snow line elevation in Central Europe.] *Petermanns Geographische Mitteilungen*, Gotha, 102(1):27–28, 1958. 12 refs. **DLC**—Snow line heights as determined by the zero isotherm are not valid since fluctuations of temperature at the snow line differ according to time and place. Several works on the subject are reviewed here. It is concluded that the real snow line (i.e., the lower border of the coherent firn-cover) in the High Tatra is at 2300 m, with an annual mean temperature of −1.8°C. The climatic snow line (i.e., the theoretical horizontal surface, ablation and accumulation of which equalize) is at 2400 m, with an annual mean temperature of −2.4°C. *Subject Headings:* **1. Snow line height determinations 2. Central Europe.**—*W.N.*

11.7–361 551.578.7

Vittori Antisari, Ottavio and Di Caporiacco, Giuliano (*both, Observatorio di Mt. Cimone*), **The density of hailstones.** *Nubila*, Verona, Italy, 2(1):51–57, 1959. 3 figs. (incl. photos), 4 tables, ref. Italian summary p. 51.—Theories on hailstone formation, methods and techniques of measuring hailstone density, as well as some results obtained from investigations

conducted at a network of stations in August 1958 are described. Small hailstones are found to be less dense than large ones, probably because the core of initial growth is the least dense part. *Subject Heading:* **1. Hailstone densities.**—*N.N. & M.R.*

HYDROMETEOROLOGY

See also: **Hist. of hydrology** (Dooge), 11.7–54; **Soil moisture effects on transpiration** (Wormer, Ochs), 11.7–90; **Forest influences on water regime, Regen River** (Kern), 11.7–97; **Sec. F3,** p. 1066; **Soil moisture-drought relationships, Virginia** (Van Bavel, Lillard), 11.7–355.

11.7–362 551.579:621.311.2(52) 551.571.3:551.524.3

Arakawa, H. (*Met. Res. Inst., Tokyo*) and Yoshimoto, H. (*Ministry of Internatl. Trade Ind., Tokyo*), **Recent trend of run-off in Japan.** *Weather*, London, 14(11):357–360, Nov. **1959.** 3 figs., 6 refs. **DWB**—In this study, runoff trend is measured by the hydroelectric potential output expressed in times of Kwh. It is defined as the available power which could have been generated, during the period considered by this paper, by all the runoff-river hydroelectric power plants available on March 31, 1958. Annual totals of precipitation over Japan were computed for the period 1886–1956. The correlation coefficient between annual totals of precipitation and the annual hydroelectric potential output was +0.85. Ten-year running averages of precipitation and hydroelectric potential output trends are compared and are shown to run parallel to each other. Financial expenditure for building dikes and for rehabilitating land attained highest values when the general trend of the precipitation over Japan started to increase (in 1890's and from about 1950). The integrated runoff, namely the total amount of water flow for a given period as expressed by the hydroelectric potential output, showed an increasing tendency over Japan since 1940. The hypothesis is suggested that an increase in the concentration of water vapor would raise noticeably the temperature in the lower layers of the atmosphere because of the "greenhouse" effect of water vapor, which in turn would itself result in an increase of water vapor. Hence an increase of atmospheric water vapor may be a possible cause of rising air temperature and increasing precipitation on a world scale. *Subject Headings:* **1. Runoff trends 2. Hydroelectric power 3. Water vapor variations 4. Temperature variations 5. Japan.**—*I.L.D.*

11.7–363 551.579:016 551.573:016

†Miller, David H., **Readings for geographers in the literature of hydrology.** University of Georgia, **1958.** 15 p. Mimeo. **DWB, DLC**—A list of 14 books (1948–1957) and 30 serials covering geographic aspects of hydrology, plus several or scores of references on each of the following subjects: 1) The hydrologic cycle, 2) Atmospheric stage (of cycle), 3) Precipitation, 4) Interception, 5) Snow cover, 6) Infiltration, 7) Soil moisture, 8) Evaporation and transpiration, 9) Ground water, 10) Overland flow and erosion, 11) Streamflow, floods, 12) Drainage and transport, 13) Lake and reservoir storage, 14) Water yield and 15) Chemical and biological phenomena. *Subject Headings:* **1. Hydrology bibliographies 2. Evaporation bibliographies.**—*M.R.*

11.7–364 551.579.4:551.577.37(448)

Guilhot, R., **Notes sur les crues de septembre–octobre 1958 dans le bassin du Chassezac.** [The September–October 1958 floods in the Chassezac Basin.] *La Houille Blanche*, Grenoble, Spec. No. A 14:692–697, Sept./Oct. **1959.** 2 figs., 2 tables. **DLC.** Also issued in *Société Hydrotechnique de France, Mémoires et Travaux*, No. 1:60–65, **1959.** 2 figs., 2 tables.—After outlining the characteristic geographical features of the basin of the Chassezac, a right bank tributary of the Ardèche, the author describes the rain and level gage system which provided the data used in this paper. A detailed examination of precipitation during the September–October 1958 flood not only reveals that the total depth of precipitation was very great but also that precipitation of exceptional intensity occurred. Furthermore, an original feature of this region is that precipitation is mainly concentrated in the intermediate basins and not on

the peaks. It was possible to follow and study the floods occasioned by the rainfall with sufficient accuracy, and high peak flows per kilometer were recorded, even for very large drainage areas (up to 4 cubic meters per second per square kilometer for 500 square kilometers). This, by the way, is not the highest recorded peak flow for the Chassezac basin. *Subject Headings:* **1. Floods, Ardèche (Sept.–Oct. 1958) 2. Rainfall distribution 3. Rainfall intensities 4. Ardèche, France.**—*Author's abstract.*

11.7–365 551.579.5

*Metz, Louis J. and Douglass, James E., **Soil moisture depletion under several Piedmont cover types.** *U. S. Dept. of Agriculture, Technical Bulletin,* No. 1207, Sept. **1959.** 23 p. 12 figs., 4 tables, 11 refs. **DWB** (M79.5 M596so)—Data are presented on soil moisture observed under forest cover, old-field vegetation, and bare soil. 1. The withdrawal and recharge of soil moisture is cyclic, repeating itself each year. Recharge begins in the late fall or winter, and depletion begins with the start of the growing season, continuing until late fall. During dry years, the soil may not be recharged to field capacity. 2. Recharge from summer precipitation adds moisture to the soil surface layers beneath vegetation; however, even for very heavy rains, the water is quickly used by evapotranspiration, so that for all practical purposes it does not move below 30 in. Low infiltration rates limit the recharge of soil moisture of barren eroded soils. 3. Depletion of soil moisture lends itself to curvilinear analysis by depths or profile and cover types. Forest types appear to deplete soils of moisture to depths of at least 66 in. at relatively the same rates regardless of species. Under old-field herbaceous vegetation and bare soil, moisture is lost primarily from the surface 30 in. although slight losses occur at greater depths. Moisture loss from barren and vegetated soils is related to depth. With increasing depth of soils, the rate of moisture loss decreases. Under vegetation this is a reflection of root concentration, while from bare soils it is a reflection of the characteristics of evaporation from soil. *Subject Headings:* **1. Moisture loss 2. Soil moisture exchange 3. Depletion curves.**—*Authors' abstract.*

11.7–366 551.579.5:631.6

†Otto, W. M., **Grondverbetering op lage zandgronden.** [Land improvement on low sandy soils.] *Wageningen. Centraal Instituut voor Landbouwkundig Onderzoek. Verslagen van Landbouwkundige Onderzoekingen,* 65(2), **1959.** 203 p. 60 figs., 45 tables, bibliog. p. 195–198. English summary p. 190–194. 6 appended colored charts (fold.). **DLC, DA**—The present study concerns a number of problems connected with land leveling in the "Gelderse Vallei," a region formed predominantly by low and medium sand cover—75 to 80% overlaid with grass. The differences in elevation cause important differences in depth of the groundwater table and in soil profile. On the other hand it is shown that the groundwater table in the Gelderse Vallei has a strong influence on the dry-matter production of grassland. The primary reason for carry out leveling projects was the excess of water in the lower lying parts of the fields. The technique of land preparation, unique in the world, is a combination of both improvement of the soil profile and leveling of the subsoil. *Subject Headings:* **1. Land leveling 2. Soil moisture 3. Ground water table 4. Soil improvement 5. Gelderse Vallei, Netherlands.**—*A. V.*

11.7–367 551.579.5:551.573:551.501.4

Szepesi, Anna (*Lőrincz*), **A telejnedvesség-tartalom napi értékeinek meghatározása éghajlati adatok alapján.** [Determination of daily values of soil moisture on the basis of climatic data.] *Időjárás,* Budapest, 63(1):7–18, Jan./Feb. **1959.** 2 figs., 4 tables, 3 refs., eqs. German summary p. 7; English summary p. 16–18. **DLC**—Thornthwaite's method of moisture balance calculation is tested by comparing measured monthly soil moisture values for the growing seasons 1951–1958 (Erdőhátpuszta) with values computed by means of Thornthwaite's method from temperature, sunshine duration, precipitation, soil moisture capacity and initial soil moisture. In 63% of the cases the difference between measured and computed weekly values was less than 30 mm, but only in 27% of the cases was it less than 10 mm. *Subject Headings:* **1. Soil moisture measurement 2. Evaporation calculations 3. Thornthwaite's method.**—*G.T.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See: **Agronomy texts,** 11.7–6; **Climat. texts** (Erinç), 11.7–7; **Climat. texts** (Milone), 11.7–11; **World climate coverage** (Wiggett), 11.7–46.

CLIMATIC ZONES

See also: **Radiation climate** (Knepple), 11.7–291.

11.7–368 551.4(57):551.581

Akademiia Nauk SSSR. Dal'nevostochnyĭ Filial, Vladivostok. Institut Geografii, **Materialy po fizicheskoĭ geografii iuga Dal'nego Vostoka.** [Materials for a physical geography of the southern Far East (Siberia, Maritime Province).] Moscow, Akademiia Nauk SSSR, **1958.** 299 p. figs., tables, refs. **DWB** (551.4 A313ma)—A useful collection of papers devoted to the region lying between the Sea of Japan and Manchuria, with Vladivostok in the south and Khabarovsk in the north. Subjects treated are: natural regions, plant and animal life, the historical geology, mineral deposits, natural stones for building materials, the hydrography of the river system, geomorphological characteristics of two of the principal river basins, the climate of the region (A. V. SMOTSENKO) with a special chapter on dry winds (I. F. SOKOLOV), and floods (A. I. KURENTSOV). Several of the articles are abstracted separately. *Subject Headings:* **1. Physical geography 2. Climate of Maritime Territory 3. Arctic U.S.S.R. 4. Maritime Territory, Asiatic U.S.S.R.**—*R. S. Quiroz.*

CLIMATE OF PARTICULAR PLACES

See also: **Climate, Turkey** (Erinç), 11.7–7; **Climate, Europe** (Dobrynin), 11.7–13; **Climate, Iowa** (Shaw, Elford), 11.7–23; **Marine climat. atlases, S. Atlantic,** 11.7–180; **Climate, Bering Sea** (Shliamin), 11.7–194; **Winter weather, Finland** (Palosuo), 11.7–203; **Met. data summaries, Luxembourg,** 11.7–243; **Climat. data summaries, Geneva** (Ruche), 11.7–247; **Climat. forecasting, U.S.S.R.** (Ped', Turketti), 11.7–265; **World climat. atlases** (Van Valkenburg et al.), 11.7–294.

11.7–369 551.4(571)(08) 551.582(571)

†Akademiia Nauk SSSR. Sovet po Izucheniiu Proizvoditel'nykh Sil, **Prirodnoe raĭonirovanie Altaĭskogo Kraia.** [Classification of Altai Territory, Siberia, into natural regions.] Moscow, Akademiia, Nauk SSSR, **1958.** 209 p. figs., tables. (*Osobaia Kompleksnaia Ekspeditsiia po Zemliam Novogo Sel'skokhoziaĭstvennogo Osvoeniia, Trudy*, Vol. 1, **1958**)—The physical geography of the Altai Territory is analytically treated in a series of 6 articles, the first of which deals with the climate of the lowland and foothill regions, followed by one on geomorphology, ground water and its use in agriculture, vegetative cover and natural grasses, natural regions and, finally, one on the natural resources of the area and their agricultural utilization. Many detailed maps, charts, cross-sections, etc. are included as well as good bibliographies and a number of photographs. *Subject Headings:* **1. Physical geography, Altai Territory 2. Climate of Altai Territory 3. Altai Territory, Asiatic U.S.S.R.**—*M.R.*

11.7–370 551.582(461):551.524.2(461)

*Mateo Gonzalez, Pedro (*Chief, Met. Observ. of Gijon, Spain*), **Termometria de Asturias.** [Temperature of Asturias.] *Spain. Servicio Meteorológico Nacional, (Publicaciónes), Serie A, Memorias*, No. 31, **1959.** 122 p. 9 figs., tables, maps, 12 refs., eqs. **DWB**—An excellent monographic study of the temperature data for 26 stations in Asturias Province (N. Spain), with textural discussion of the stations, the methods of compilation and smoothing of data (means, extremes, etc.), reduction to sea level, etc. Remarks on local, seasonal and annual variations in temperature are included. Tables give monthly data from beginning of record through 1956. Sixteen isothermal charts and one station location chart, several scatter diagrams and many tables are included. *Subject Headings:* **1. Temperature data 2. Isothermal charts 3. Asturias, Spain.**—*M.R.*

11.7–371 551.582.1:551.43(479.24)

Pykhtunova, V. M., **Guba-Khachmag massivinin aglim khüsusäiïtlări häggynda.** [Climatic peculiarities of the Kuba-Khachmas range.] *Akademiia Nauk Azerbaĭdzhanskoĭ SSR, Doklady*, 14(11):869–874, **1958.** 4 figs., table, 9 refs. Russian summary p. 874. **DLC** (AS262.A582)—The varied topographic features of the Kuba-Khachmas range render its climate extremely varied, ranging from moderate steppe in the plains to cold and even tundra climate in high locations. Winters are mild with little snow; summers are mostly warm, in lower locations they are hot. The region is subject to frost, föhn and sukhovei, which endanger farming. As a whole the region has an exposed location and is therefore colder than the rest of Azerbaidzhan. Annual average temperature is 12°C in the plains, 8–10°C in the foothills and in the mountains 0 to −5°C. Precipitation varies from 300 mm in the plains to 700 in the mountains. Annual evaporation is 800–1000 mm. *Subject Headings:* **1. Climate of the Kuba-Khachmas range, Azerbaidzhan 2. Topographic effects on climate 3. Kuba-Khachmas range, Azerbaidzhan S.S.R.**—*G.T.*

11.7–372 551.582.1(85) 551.586:612.014.4

*Unanue, José Hipolito, **Observaciones sobre el clima de Lima y su influencia en los seres organizados, en especial el hombre.** [Observations on the climate of Lima and its influence on living beings, especially man.] Introduction and comments by Carlos Enrique Paz Soldán. Lima, Comision Nacional Peruana de Cooperación Intelectual, **1940.** 5th popular ed. 98 p. (introd.)+151 p. text. Text conforms to the 2d ed., pub. Madrid, **1815.** port., tables (2 fold.). **DLC**—A book giving extensive notes on the climate and bioclimatology of Lima, including meteorological tables for 1799 and 1800. Sun, moon, eclipses, winds, rain, earthquakes, etc. and influence on vegetation, animals, humans, psychology, diseases, diet, etc. are treated. The introductory tribute to UNANUE is almost as long as the text itself. *Subject Headings:* **1. Climate of Lima, Peru 2. Bioclimatology 3. Lima, Peru. I. Paz Soldán, Carlos Enrique.** —*M.R.*

11.7–373 551.582.3:551.577.2(943)

Coaldrake, J. E. and Bryan, W. W., **Rainfall map of southeastern Queensland.** *Australia. Commonwealth Scientific and Industrial Research Organization. Div. of Plant Industry, Technical Paper*, No. 8, **1957.** 15 p. 4 tables, 2 refs., map (col., fold. on 2 sheets, 76×101 cm) is on scale about 1:500,000. **DLC** (G9001.C8 1950.C6), **DWB** (M77.2/943 A938ra)—The map shows mean annual rainfall over about 100,000 sq mi of southeastern Queensland at a scale of 1 in. to 8 mi; it is based on approximately 400 more stations than previous maps of the same area. The means are calculated on a normal period of 30 yrs, stations with shorter records having been weighted statistically. A complete list is given of the records used, and the interpretation and limitations of the map are discussed. *Subject Headings:* **1. Rainfall charts 2. Annual rainfall maps 3. Queensland, Australia.**—*Authors' abstract.*

CLIMATIC CHANGES

See also: **Climat. changes, Iran** (Ghirshman), 11.7 4; **Climat. variations, African coast** (Morgans), **11.7–193**; **Quaternary glaciation, Far East** (Chemekov), **11.7–223.**

11.7–374 551.583:551.588.7:551.482.2(282.252)

Koloskov, P. I., **Odna iz gipotez melioratsii klimata chasti SSSR (v poriadke diskussii).** [One of the hypotheses on climatic amelioration of a part of the U.S.S.R.: a discussion.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Aeroklimatologii, Trudy*, No. 6:93–102, **1958. DWB**—As a means of ameliorating the climate of the U.S.S.R., the author proposes shifting the mouth of the Amur River to a new position relative to the Tatar Straits by combining the Amur River with the Tatar Strait through Kiza Lake where, at Bukhta Bay, the distance to the sea is reduced by 250 km. As a result, in addition to other changes, the Amur estuary would be filled with salt water having a lower freezing temperature, and the movement of water in the Sea of Okhotsk from the Sea of Japan into the Tatar Straits would increase. The boundary of freezing of water in the Tatar Straits would be displaced northward and north of this line freezing would occur later than at present. The contents of this paper include the

following, viz: a detailed discussion of the most important local results—climatic, hydrologic, navigational, etc. —of the transposition of the mouth of the Amur River to Taba Bay, the transformation of the hydrology of the basin of the Amur River, the union of the Ussuri River with Peter the Great Bay through Lake Khanka, the warming up of the northern regions of the coastal seas (Sea of Japan, Sea of Okhotsk and Bering Sea), and the increased humidification and reduction in continentality of the zone of deserts and dry steppe. *Subject Headings:* **1. Climatic amelioration 2. Hydrography 3. Amur River 4. Asiatic U.S.S.R.**—*I.L.D.*

11.7–375 551.583:581.056:634.94(480)

Landa, Miroslav, **Změny podnebí a lesnictví.** [Climatic changes and forestry.] *Meteorologické Zprávy*, Prague, 11(6):160–162, **1958.** 5 figs. **DWB, DLC**—Translation (with brief introduction and comment) of a paper by Yrjö Ilvessalo (Finland), **Variations of growth due to climatic conditions and their consideration in growth studies,** delivered at the Oxford Conference of International Union of Forest Research Organizations in 1956. On the basis of several national surveys for Finland, data on tree growth index fluctuation since the end of the 19th century are presented. No specific reference is made to the effect of climatic elements. *Subject Headings:* **1. Climatic changes 2. Climate and tree growth 3. Forestry 4. Finland.**—*G.T.*

11.7–376 551.583.14:551.311

Vogt, J., **Aspects de l'évolution morphologique récente de l'Ouest Africain.** [Aspects of recent morphological evolution in West Africa.] *Annales de Géographie*, Paris, 68(367):193–206, May/June **1959.** 2 figs. **DLC**—Recent morphological investigation in West Africa shows that when extensive relief has set, the passage from wet tropical climate to dryer climates leads to the forming of glacis in soft rocks. Evolution of relief occurs less and less at the expense of a weathered mantle, giving to the erosive system a peculiar efficacy, and thus rendering climatic reconstruction more difficult. *Subject Headings:* **1. Geomorphology of arid lands 2. Climatic trends 3. Dry and wet climate alternation.**—*A.V.*

MICROCLIMATOLOGY

See also: **Soil climates, Siberia** (Gorshenin), 11.7–2; **Micromet. conf.** (Laĭkhtman), 11.7–38; **Greenhouse microclimat.** (Spoelstra), 11.7–91; **Ion concentration in gymnasia** (Vytchikova), 11.7–107; **Shelter belt microclimat.** (Mirkin), 11.7–320.

11.7–377 551.584.2:551.468

Bailey, Harry P., **Analysis of coastal climates with particular reference to humid mid-latitudes.** (In: Coastal Geography Conference, Louisiana State Univ., April 6–9, 1959, **[Proceedings],** issued **1959.** p. 23–55. 8 figs., 6 tables.) **DWB** (551.36 C652se)—The original purpose of this study was an analysis of coastal climates around the world as related to other physical aspects of coastal landscapes, especially vegetation. In the course of the investigation, two problems arose that had not been entirely foreseen. The first lay in the fact that the distribution of vegetation along humid midlatitude coasts (excluding special forms such as march grass) did not correspond with the patterns of climate that have been devised in the past. That discrepancy required fresh investigation of the climates of the several coasts involved, and led to recognition of the second problem: the lack of a generally accepted method for the statistical analysis of the content of a climatic region. The two problems are discussed in this investigation. The method suggested for the statistical analysis denotes that the climatic characteristics of a given region are given by the lower and upper quartiles for a specified climatic element. By quartile analysis a description of the climates of the entire world has been achieved, proving the feasibility of a new system of regional alliances in the humid mid-latitudes that brings climatic distribution into better correspondence with vegetative distribution. *Subject Headings:* **1. Local climatic studies 2. Coastal climates** —*I.S.*

11.7–378 551.584.31:551.521.1(47

Zakharova, A. F., **Radiatsionnyĭ rezhim severnykh i iuzhnykh sklonov v zavisimosti o geograficheskoĭ shiroty.** [Radiation regime of northern and southern slopes as a function o

geographical latitude.] *Leningrad. Universitet, Uchenye Zapiski*, No. 269:24–49, **1959.** 7 figs., 7 tables, 14 refs. **DLC**—In this study, the author analyzed the hourly radiation flux on northern and southern slopes with a steepness of 10, 20, 30 and 40° in lat. 42, 50, 60 and 75° including a fundamental part of the area of the U.S.S.R. The analysis was made only for those days that correspond to solar inclinations of +23, +18, +13, +8, +4, +0, −4, −8, −13, −18 a nd −23°. The solar radiation flux $Ja\beta$ for each slope having a direction of inclination a and slope β was computed by the formula $Ja\beta = J[\cos h \sin \beta \cos (A-a) + \sin h \cos \beta]$, where J = solar radiation flux on a surface perpendicular to the rays, h = solar elevation and A = solar azimuth. Tables are presented showing hourly values of radiation flux for four days of the year corresponding to solar inclinations of +23, −23 and 0° for northern and southern slopes, possible daily heat totals (for cloud free sky) computed for hourly values of radiation flux for all the above solar inclinations, daily heat totals of direct radiation on northern and southern slopes in percent of totals for horizontal surfaces, heat totals in percent of heat on a horizontal surface at lat. 42°, actual daily heat totals of solar radiation on the 15th day of each month (in cal/cm²/day) for individual points and the monthly totals of heat of direct radiation (in kcal/cm²). The fundamental factor of the radiational regime of the northern and southern slopes of varying steepness is the difference in the angles of incidence of the rays upon the slope. In addition to these fundamental factors of angle of incidence and length of day, radiation conditions depend upon cloudiness and atmospheric transparency. The stations examined in the U.S.S.R. are divided into the following 3 groups, viz.: (1) points where the astronomic factors and cloudiness influences generally are in harmony and the actual radiation regime is similar to the possible theoretically computed regime (Pavlovsk); (2) points where the variation of cloudiness perceptibly alters the possible radiation regime but this influence yields to that of the angle of incidence and duration of illumination (Tashkent, Tiflis, Saratov, Yakutsk) and (3) points where the effect of cloudiness is manifested more strongly than that of astronomical factors which creates a radiational regime actually different from that of the possible one (Vladivostok). *Subject Headings:* **1. Slope microclimatology 2. Solar radiation on slopes 3. U.S.S.R.**—*I.L.D.*

11.7–379 551.584.33(282)(439.1)

Kiss, Á. (*Climatological Inst. Szeged Univ.*), **Angaben zum Mikroklima des Überschwemmungsgebietes der Theiss.** [Microclimatic data of the flood area of the Tisza River.] *Acta Geographica*, Szeged, Hungary, 2(1/4):37–41, **1956.** fig., 2 refs. **DLC**—At various points in the flood area of the Tisza temperatures were measured with electric resistance thermometers at 5 cm above the water surface, 5 and 150 cm above the ground, 10 cm below the water surface and 2 and 10 cm below the ground surface. The results of measurements taken at three different stations at the same time are presented in tables and analyzed. The role of water surface, vegetation, soil moisture and weather conditions in the distribution of vertical temperatures at the three stations is discussed. *Subject Headings:* **1. River micrometeorology 2. Tisza River, Hungary.**—*I.L.D.*

11.7–380 551.584.4:633.2

Biel, Erwin R. (*Rutgers Univ., N. Jersey*), **Microclimate and grassland.** *American Association for the Advancement of Science, Wash., D. C., Publication*, No. 53:263–274, **1959. DWB** (M86:58 A512gr)—The soil is the active surface that absorbs solar insolation during the day and cools by terrestrial radiation during the night; the layer close to the ground is heated and cooled from the soil by conduction, radiation, and convective turbulent currents. This leads to different temperatures at different heights from the surface. Similar differences are found in humidity also because the surface is the primary source-region of evaporation and all water vapor has to pass through the microlayer as transmitter. The reason for all this is the reduced motion within the lowest atmospheric layer as a result of skin friction. In addition to these vertical differences, horizontal differences are also discussed. Microclimate can be changed by simple techniques as illustrated by examples. The U. S. Weather Bureau plans to set up "climatological bench-mark network" whose observational program will include observation of certain microclimatic factors. *Subject Heading:* **1. Grassland microclimatology.** —*I.S.*

CLIMATIC CLASSIFICATION

See also: **Landscape-climate classification** (Ivanov), 11.7–12; **Classification of Ceylon forest communities according to Thornthwaite** (Koelmeyer), 11.7–96; **Climat. regions and plant rejuvenation** (van Steenis), 11.7–98; **Rain forest climate** (Webb), 11.7–99; **Desert animal ecology** (Schmidt-Nielsen), 11.7–383.

11.7–381 551.585(47):63

Koloskov, P. I., **Voprosy agroklimaticheskogo raĭonirovaniia territorii SSSR.** [Problems of the agroclimatic regionalization of the U.S.S.R.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Aeroklimatologii, Trudy*, No. 6:5–51, **1958.** tables, map (colored, fold.) appended at end. **DWB**—In connection with a proposed monograph on the **Agroclimatic regions of the U.S.S.R.** to consist of five parts and to be aimed at all phases of agriculture, the author discusses in this paper the climatic regional classification of the U.S.S.R. for agricultural purposes that may serve as material for the first part of the proposed monograph. In addition, various theoretical and methodological problems relating to other parts of the monograph are touched upon. The contents of this paper comprise the following: construction of a map of agroclimatic regions of the U.S.S.R. for agricultural purposes, including the classification of the territory into belts according to temperature conditions of the warm season and according to the concomitant index of vegetation; the subdivision of the temperature units into zones characterized by moisture and associated soil zonation; the subdivision of the moisture zones into regions characterized by temperatures during the cold season of the year and the associated properties of woody growth such as the annual total of negative mean daily temperatures and, finally, the territory is subdivided into districts on the basis of the thickness of snow cover. The geographic distribution of the climatic regions in the U.S.S.R., including descriptions of the Arctic belt, the temperate belt and subtropic belt, is presented. The discussion of the agricultural potential of climatic classification contains a description of the following agroclimatic regions, viz: the reindeer raising and hunting regions; the forestry region; the region of pasture-meadow system of agriculture; the regions of complex agriculture and rotating system of agriculture; region of grass-steppe agriculture as a foundation; region of grazing animal industry with small oasis base; complex region of the subtropic belt; irrigated lands with large climatic amelioration effect. Also the method of agroclimatic classification of a territory in relation to individual agricultural crops; the complex bioclimatic systems of automatic compensation and the duration of the heat period, length of the vegetation period and the multiple harvesting of crops are discussed. *Subject Headings:* **1. Agroclimatic regions 2. U.S.S.R.**—*I.L.D.*

BIOCLIMATOLOGY

See also: **Control of plant environment,** 11.7–42; **Sec. B2,** p. 1031; **Sec. B4,** p. 1037; **Climatic effects on vegetation** (van Steenis), 11.7–98; **Föhn effects on blood clotting** (Zürcher), 11.7–102; **Acclimatization** (Müller), 11.7–106; **Föhn sickness** (Obenland), 11.7–316.

11.7–382 551.586:551.525.4:633.18

Petrasovits, Imre, **A rizs különböző mélységu árasztóvizének hömérsékleti hatásáról.** [Temperature effect of rice flooding water of various depths.] *Időjárás*, Budapest, 62(2):99–107, March/April **1958.** 2 figs., 3 tables 4 refs. In Hungarian; Hungarian and Russian summaries p. 99. **DWB, DLC**—Water temperature (and corresponding air and soil temperature) data obtained at various depths in fields covered with 5–15 and 25 cm of water, respectively, are presented and discussed. Data on rice plant development in these fields (and an uncovered field) are included. The measurements (believed to be the first of their kind, except for less extensive ones made in Italy) were made in Kisujszálás and Szarvas during the growing seasons of 1955 and 1956. *Subject Headings:* **1. Rice paddy microclimatology 2. Water temperatures 3. Hungary.**—*G.T.*

11.7–383 551.586:551.585.53:599.735.1

Schmidt-Nielsen, Knut (*Duke Univ., N. Carolina*), **Animals and arid conditions.** *UNESCO, Arid Zone Research*, 11:217–221, pub. **1958.** 8 figs. French summary p. 221. **DWB** (M84 US8cl)—Heat and water regulation of several burrowing and other desert animals are discussed. The kangaroo rat and the zebra are found to be the most efficient desert

mammals from the point of view of water conservation; among the nonburrowing mammals the camel is the most efficient desert animal known at present. *Subject Heading:* **1. Desert animal ecology.**—*G.T.*

11.7–384 551.586:581.14

Lona, Fausto (*Instituto Botanico dell'Università di Parma, Italy*), **Results of twelve years of work on the photoperiodic responses of Perilla ocymoides.** *Akademie van Wetenschappen te Amsterdam. Afdeeling voor de Wis- en Natuurkundige Wetenschappen, Proceedings of the Section of Sciences, Ser. C,* 62(3):204–210, **1959.** 2 figs., 16 refs. **DLC**—This paper summarizes the knowledge of the flowering behavior of short-day plants, with special emphasis on *Perilla ocymoides* which has been the object of a series of experiments between 1946 and 1958 by the writer. The observations are compared with other plants, especially *Xanthium italicum.* These comparisons reveal that short-day plants differ in many ways. This is explained by analyzing their photoperiodic reaction, e.g., with regard to the perception of the photoperiodic stimulus; the subsequent process of floral induction; the after-effect of a number of inductive cycles; the reversibility of floral induction in unfavorable photperiods, which may lead to reversal to the vegetative phase; and the localization of the generative phase in the plant. For *Perilla ocymoides* it is shown that: 1) After a number of short-day cycles the leaf becomes anthogenous for about 3 months. This primary reaction in the leaf is strictly localized and essentially irreversible; 2) Considered as a whole, the plant reverts readily from the generative to the vegetative state. Indirect induction or an after effect do not exist; 3) There is a stream of anti-anthogenous substances from the vegetotrope leaves; 4) Photoperiodic impression of the leaf does not depend on the presence of a reacting meristem; 5) As plants grow older, the minimum number of short photoperiods required for induction decreases. *Subject Headings:* **1. Photoperiodism 2. Flowering of plants.**—*A.V.*

11.7–385 551.586:598.1:591.1(85)

†Saint-Girons, H. and Saint-Girons, M. C., **Cycle d'activité et thermorégulation chez les reptiles (lézards et serpents).** [Cycle of activity and the thermoregulation of reptiles (lizards and serpents).] *Vie et Milieu,* pub. Paris, Hermann, 7(2):133–226, **1956.** 30 figs., tables, bibliog. p. 220–226. (*Actualités Scientifiques et Industrielles,* No. 1250.) **DLC** (Q1,11.A3)—Extensive and intensive microclimatic data are presented and analyzed in tables and graphs for several climatic zones of the Atlas Mountains and in the Andes of southern Peru, in connection with a monographic study of the ecology and daily or seasonal cycles of the various types of reptiles indigent to these parts. Factors considered are solar radiation, heat conductivity of air and of soil as represented by temperature at several heights above ground, humidity, soil (sand) temperature at various depths. Extremes of temperature for life and for phases of life, optimum temperatures, effect of cover, light, rainfall, etc., are treated. *Subject Headings:* **1. Seasonal metabolism variations 2. Thermal balance of animals 3. Reptile ecology 4. Peru.**—*M.R.*

11.7–386 551.586:628.8 551.586:612.014.4

*Kronberg, Nathan (*W. B. State Climatologist for S. Carolina*) and Purvis, John C. (*W. B. Airport Sta., Columbia, S. Carolina*) et al., **Climatic data for air conditioning in South Carolina.** *South Carolina. Agricultural Experiment Station, Climatic Series,* No. 3, April **1959.** 21 p. mostly tables, 6 refs. **DWB** (M(055) S726cl)—Discomfort is a function of both temperature and moisture content of the air. Air conditioning engineers have treated this dual aspect of weather effect in a number of ways. One of the most promising had been through the use of the term "Effective Temperature." More recent techniques involving somewhat the same concepts but using different scales are those of sentient temperatures and discomfort index (temperature-humidity). In this paper definitions are given of these three terms and hourly tallies of temperature and humidity frequencies are tabulated. Tables I and II summarize sentient temperature and discomfort index frequencies for the months and seasons of greatest need for cooling. Table III gives percentages of frequencies of dry and wet bulb combinations calculated from the same original data as Tables I and II. Chart 1 (cover page) shows the relationship existing among the readily available psychrometric parameters and the comfort indexes, effective and sentient temperatures. A conversion grid is shown (p. 7) to convert

the temperature and relative humidity tabulation to sentient or wet bulb values. Table IV is also a conversion table from dry bulb temperatures and relative humidities to other air conditioning indexes. *Subject Headings:* **1. Comfort indexes 2. Air conditioning data analysis 3. Effective temperatures. I. Collings, Gilbeart H. II. Cook, James, C., Jr.**—*I.S.*

UPPER AIR CLIMATOLOGY

See: **Upper air frequency charts, S. Atlantic,** 11.7–180.

ENVIRONMENTAL INFLUENCES

See also: **Soil moisture and aeration effects on spruce seedlings** (Richard), 11.7–216; **Coast effect on typhoons** (Arakawa), 11.7–282; **Topographic effects on precip.** (Fel'dman), 11.7-352; **Topographic effects on precip.** (Weinländer), 11.7-356; **Climat. amelioration, Asiatic U.S.S.R.** (Koloskov), 11.7–374.

11.7–387 551.588.2:551.515.11:551.542(482)

Barg, Benno (*Inst. für Grosswetter. der Met. und Hydrol. Dienstes der DDR, Potsdam*), **Ein Beitrag zur Frage des orographischen Einflusses des südnorwegischen Berglandes auf zyklogenetische Vorgänge und allgemein auf das Bodendruckfeld im Skagerrak.** [Contribution to the problem of the orographic influence of the mountain regions of southern Norway on cyclogenetic processes and the general surface pressure field in the Skagerrak.] *Studia Geophysica et Geodaetica*, Prague, 3(1):82–91, **1959.** 5 figs., table, 12 refs., 10 eqs. Russian summary p. 91. **DWB**—The investigation into the development of the pressure field in the Skagerrak was conducted by the Institute for Large-scaled Weather Research using numerical methods. The basic material was 25 synoptic cases during 1954–1958, of which 23 were from the period Nov.–April when the orographic influence intensifies considerably the prevailing trough and cold air layer. The 500 mb forecast (by Fjørtoft's method) and 500/1000 mb relative topography (by Estoque's method) when subtracted graphically yielded the 24 hr surface forecast chart. The orographic influence was determined by means of the grid point procedure. The results presented in charts and tables show no particular orographic influence, rather it is assumed to be that of a jet effect. *Subject Headings:* **1. Orographic effects on cyclogenesis 2. Pressure fields 3. Skagerrak.**—*W.N.*

11.7–388 551.588.2:551.552:551.542(234.9)

Koshinskiĭ, S. D., **Orograficheskie vozmushcheniia v pole vetra.** [Orographic disturbances in the wind field.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:25–30, May **1959.** 3 figs., 3 tables, 2 refs., 3 eqs. **DWB, DLC**—As a result of the situation of the Caucasus Mountains, the greatest wind direction frequencies over the Caspian Sea are northwesterly and southeasterly, i.e., winds blowing along the ridges. In this article the author attempts to determine the relationship between wind velocity and pressure field on the western coast of the Caspian Sea during northwesterly and southeasterly storms. Maps of the distribution of mean wind velocities and pressure fields over the Caspian based on observations during severe storms and data on mean values of actual wind velocities (v) and geostrophic (vg) winds for different points of the northern and central Caspian are presented. A comparison of v and vg in the case of strong southeast winds and storms shows that v and vg fluctuate within the limits 0.55–0.75; in addition no dependence of v/vg upon latitude was observed. This indicates that the influence of the ranges of the Greater Caucasus is reflected only in the direction of the winds over the Caspian Sea and does not disturb the linear dependence of wind velocity upon the pressure gradient

$$v = \frac{k}{2\rho\omega \sin \varphi} \frac{\partial p}{\partial n}.$$

In the case of the northwesterly storms this expression was not always fulfilled. The values v and vg indicate that during the cold season the ratio of actual northwesterly wind and geostrophic wind fluctuates on the average between 0.70 and 0.85 over the northern Caspian. This indicates that in the north no perceptible distortions are observed over the northern

Caspian and that the usual wind pressure law prevails. With displacement to the south the ratio of v to v_g increases attaining its maximum value (1.40) at lat. 40°N. An analogous dependence of v/v_g upon latitude is observed also in northwesterly storms of the warm season south of 43°S. Finally, the dependence of the velocity of the north wind upon the pressure field includes the characteristics in the dependence of the velocity of the north wind upon the pressure field in that in the case of the Baku north the horizontal movement the air mass along the western coast of the north Caspian is characterized by great instability. The wind velocity is given by $v \approx 0.7\sqrt{160\Delta p + v_0^2}$, where v_0 = initial velocity, i.e., northwest wind velocity at Makhachkala, and Δp = pressure gradient. The results of comparison of north wind velocity computed with this formula with the mean velocity for the region are presented and analyzed. *Subject Headings:* **1. Orographic effects on wind 2. Wind velocities-pressure field relationships 3. Caucasus.** *I.L.D.*

SYNOPTIC CLIMATOLOGY

See also: **Ceiling-visibility data, Salisbury Airport, Rhodesia,** 11.7–78.

11.7–389 551.589(474.5)

§*Šćemeliovas, V. M., **Apie orų dinamiką Lietuvos TSR teritorijoje.** [The dynamics of weather over the Lithuanian S.S.R.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Mokslinial Pranešimai,* 10(1):87–113, **1959.** 16 figs., 10 tables, 11 refs. Russian and English summaries p. 111–112.—The work applies and illustrates the main laws of weather formation and dynamics in connection with the circulation factors in the hot and cold seasons of the year. The data (10-years of observation at 24 weather stations for January and July), was worked up according to the method of complex climatology and was used, in conjunction with synoptic material. The chief factors conditioning weather dynamics over the Lithuanian S.S.R. are air masses of different origin with their fronts in different baric systems. In January, on an average, 24 fronts and in July 32 fronts of different types pass over the area, as a consequence of which the type of weather correspondingly changed from 14 to 19 times. Because of transformation the variability of weather reaches only $\approx \frac{1}{4}$ of the whole variability. Table 3 illustrates the probability of the duration of similar weather periods. Table 4 illustrates the connection of the present day's weather with the next day's weather. Illustration 8 shows the dependence of the weather on air masses, fronts and baric systems in the cold period of the year. The coldest winter weather (Types XIII and XII) is formed under conditions of continental arctic and polar air advection, which are followed by transformation. The influx of maritime arctic and, more southerly, continental air masses results in a temperate frosty weather (Type XI). The weather with a stable passing of temperature over 0°C (Types VIII and IX) is under the conditions of maritime-polar air advection. In summer (Fig. 16) the weather mostly depends on air masses too, especially on their stratification caused by baric systems and the activity of fronts. Fig. 2–7 and 9–15 illustrate the importance of circulation factors for the formation of different weather types, and also show the laws of the change of air masses, baric systems and the activity degree of fronts when one type of weather changes to another. *Subject Headings:* **1. Dynamic climatology of Lithuania 2. Lithuanian S.S.R.**—*From author's abstract.*

MISCELLANEOUS

COSMIC INFLUENCES

See: **Cosmic effects,** 11.7–39; **Lunar effects on cosmic ray intensity** (Bagge, Binder), 11.7–133; **Solar-magnetic relationships** (Egedal), 11.7–154.

VISIBILITY

See also: **Convective current effects on visibility** (Kargol), 11.7–332.

11.7–390 551.591.1

†Foitzik, Leonhard (*Berlin-Niederschönhausen, Platanenstr.* 106*a*), **Aufgaben und Ergebnisse der Sichtforschung.** [Problems and results of visibility research.] *Zeitschrift für*

Meteorologie, Berlin, 12(4/6):154–157, April/June **1958.** 36 refs., eq. **DWB, DLC**—In the general treatment of the visibility problem, the condition $K = \epsilon$ (where K = brightness contrast and ϵ = contrast threshold of the eye) gives rise to two fundamental research problems. One is concerned with the brightness contrast, K, between visibility target and surroundings and the other with the contrast threshold of the eye and its dependence upon different factors. A third task is the fulfillment of $K = \epsilon$ in such a way as to render it practically applicable. The apparent contrast K—referred to the locus of the observer is a function of target distance and inherent target contrast K_o—referred to the locus of the target. The functional dependence $K = K(l, K_o)$ is dependent upon extinction and scattering coefficient of light in the atmosphere. The treatment of visibility in haze and fog has led to the study of spectral light transmission and spectral light extinction coefficients of the atmosphere. Experimentally determined anomalies were interpreted by STRATTON and HOUGHTON according to a theory of light extinction based upon Mie's theory of light scattering by dielectric spheres of radius ρ as a function of wave length λ. Studies on the dependence of the scattering function σ upon scattering angle φ in haze and fog led to numerical evaluations on the basis of Mie's theory etc. New systematic laboratory investigations of $\epsilon(\zeta,\beta)$ where ζ = target angle and β = diminishing light density have been carried out. Data are available on the $\epsilon(\zeta,\beta)$ function for circular targets in a uniformly bright background and ϵ—values for targets of other shape can be reduced to these for circular targets by equating their surfaces. In connection with practical aspects of visibility, mention is made of visibility observations under nonideal conditions during twilight and at night; normal visibility values for particular application to special visibility distances, visibility of radiated or nonradiated atmospheric targets, etc. Other studies on the various aspects of visibility are mentioned briefly. *Subject Headings:* **1. Visibility research 2. Brightness contrast 3. Contrast threshold.**—*I.L.D.*

OPTICAL PHENOMENA

See also: **Twilight obs. of aerosol layers** (Bigg), 11.7–269; **The Poynting-Robertson effect and zodiacal light** (Guigay), 11.7–293.

11.7–391 525.75 551.593.1:551.524.4

Ives, Ronald L. (*Beckman and Whitley, Inc.*), **Apparent relation of "stepped" sunset red to inversions.** *American Meteorological Society, Bulletin*, 40(6):311, June **1959.** fig. **DWB, DLC**—A brief description and representation in diagram of two distinct configurations of the sunset colors over the Pacific observed on a number of flights by commercial airliners from Los Angeles to San Francisco. One appeared standard but in the other the red was sharply bifurcated, the lower part being very deep red and having an angular height of about half a degree. A checking of weather conditions at the time of observation leads to the likely conclusion that the phenomenon is due to abnormal refraction through the thermal discontinuity of the inversion. *Subject Headings:* **1. Sunset colors 2. Temperature inversions 3. Refraction phenomena.**—*I.S.*

11.7–392 551.593.11:535.

Raman, Sir C. V., **The optics of mirages.** *Current Science*, Bangalore, 29(8):309–313, Aug. **1959.** 3 figs. **DWB, DLC**—The basic concepts, origin and applications of superior and inferior mirages are discussed. The article illustrates from the works of various authors the theoretical and practical problems associated with mirages and wave optics, the observation of caustic and accompanying interferences, and the cusped wave fronts. *Subject Headings:* **1. Mirages 2. Optical theories.**—*N.N.*

11.7–393 551.593.65:

§†Driving, A. Ia., **O perlamutrovykh oblakakh.** [Mother-of-pearl clouds.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 3:410–421, March **1959.** 5 figs., table, 58 refs. **DLC**—The characteristics of mother-of-pearl clouds are summarized chiefly on the basis of the studies of MOHR and STÖRMER. Their maximum frequency was found to be in December–February. The clouds become colored with spectral light if the angle between the direction to the cloud

and the direction to the sun is between 4 and 40° and between 144 to 166°. On the average they occur along the solar vertical. Thus light is between 22.3 and 26.1 km on days on which mother-of-pearl clouds were observed over Oslo. Stormy weather with prevailing west winds was observed over much of the North Atlantic and northern Europe; the minimum pressure was north of Oslo over the Norwegian Sea, Iceland, Spitsbergen, the Barents Sea and over northeast R.S.F.S.R. In most cases föhn from southeast Norway blew over Oslo when mother-of-pearl clouds were observed. Mother-of-pearl clouds were observed between Jan. 14 and March 8, 1932, when an unusually warm winter anticyclone prevailed over most of Europe. The anticyclone was one of the strongest of recent decades. Searchlight soundings over Moscow compared with maps have shown that when maps of absolute topography of the 200 and 300 mb surface indicated the possible rise of air masses in the region of high altitude zone and aerological data indicated corresponding cooling along the entire layer with height the aerosol observed in the stratosphere was a condensation product. Polarization data indicate that clouds at 22.2 km consist of particles 1.5μ in diameter, close to the dimensions of the droplets of mother-of-pearl clouds. Since the mother-of-pearl clouds arise in the region of a high frontal zone then descending currents at corresponding altitudes should influence the variation of total ozone amount and its vertical distribution since ozone forms at these altitudes and its concentration is at a maximum. The comparison of observations of mother-of-pearl clouds and ozone measurements over Norway indicate that an increase of the total amount of ozone over Tromsö coincides with a rise in the frequency of occurrence of mother-of-pearl clouds. The maximum of these two processes coincides in time with the presence of winter stratospheric jet streams over northern Europe at altitudes responsible for the variation of the total ozone amount and for the formation of mother-of-pearl clouds. *Subject Heading:* **1. Nacreous clouds.**—*I.L.D. & author's summary.*

ELECTRICAL PHENOMENA

See also: **Lightning hazards to aircraft fuel tanks** (Robb et al.), 11.7–76; **Ion concentration measurement** (Vytchikova), 11.7–107; **Auroral ionization** (Chivers, Greenhow), 11.7–163; **Atmos. elec. measurement** (Paramonov), 11.7–230; **Electron density determination** (Roberts et al.), 11.7–233; **Atmos. elec. stations** (Israël), 11.7–241; **Ion density** (Kroening), 11.7-249; **Ionization effects on human organisms** (Dussert-Bergerac), 11.7–271; **Elec. of precip.** (Mukherjee), 11.7–357.

11.7–394 551.594.11:551.511.6

Large, M. I. and Wormell, T. W. (*both, Cavendish Lab., Cambridge, Eng.*), **Fluctuations in the vertical electric field in the frequency range from 1 cycle per second to 500 cycles per second.** *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued **1958.** p. 603–607. 3 figs., 2 tables, 5 refs. **DWB** (M(055) C748pr)—It has been shown by the work of Whitlock and Chalmers and of Large that the frequency range from 1 to 0.01 c/sec in the spectrum of the variations in the vertical electric field near the earth's surface is associated with the motion and turbulent diffusion of the space-charge distribution in the lowest few tens of meters of the atmosphere in the immediate vicinity of the site of observation. The range of frequencies immediately above this is of particular interest from many points of view. In it the main cause of the fluctuations changes over from a local one to distant lightning discharges, with a possibility of other effects playing an appreciable part. Owing to the transmission properties of electromagnetic waves in this region there is a possibility of using observations in it as an index of world wide thunderstorm activity, a field which has been intensively explored by Holzer and Deal. Most previous investigators of this range of frequencies have considered it necessary to make the observations at special sites where noise of artificial origin is exceptionally low. The technique used in the investigation described in this paper uses sharply tuned receivers at a series of discrete frequencies. It is thus possible to avoid frequencies where artificial disturbance is obvious, in particular the fundamental and harmonies of the power frequency (50 c/sec in England). One of the objects of the present work was to investigate the possibility of making such observations at an average site. *Subject Headings:* **1. Atmospheric electricity measurement by radio 2. Electric field variations 3. Turbulent diffusion-electric field relationships.**—*Authors' abstract.*

11.7–395 551.594.13:551.521.64(261):551.507.352

Sagalyn, Rita C. (*G. R. D., A. F. Cambridge Res. Ctr., Air Res. & Devel. Command*), **The production and removal of small ions and charged nuclei over the Atlantic Ocean.** *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued **1958.** p. 21–41. 11 figs., 3 tables, 19 refs., 3 eqs. **DWB** (M(055) C748pr)—The spatial distribution and time variations of electrical conductivity and charged nucleus concentration have been investigated in a series of aircraft flights carried out over the Atlantic Ocean, approximately 1000 mi from the east coast of the United States, in the altitude range 500–20,000 ft. It is found that after an air mass from the continent has been over the ocean 40 hr a homogeneous exchange layer is developed; the upper boundary of the layer corresponds to the upper boundary of the maritime air-mass. In the exchange layer the concentration of pollution particles is lower and the mean radius is larger than the values observed over land. Analysis shows that this is the result of the modification of nuclei of continental origin by coagulation due primarily to Brownian motion, mixing and subsidence. Although the nucleus concentration is about a factor of four lower than the values observed over land, the magnitude of the electrical conductivity of the experimental results with theory shows that this is due to the fact that over the ocean cosmic radiation is the only source of ionization, and to larger values of the attachment coefficients for collisions between small ions and nuclei. Over the ocean, unlike the results obtained over land, there is observed no regular daily variation in the vertical distribution of the electrical conductivity or charged nuclei. The results of measurements of the ratio of the negative to positive conductivity obtained on the ocean flights are presented. *Subject Headings:* **1. Atmospheric electricity measurement by airplane 2. Cosmic ray ionization 3. Vertical electrical conductivity distribution 4. Electrical conductivity over oceans 5. Atlantic Ocean.**—*Author's abstract.*

11.7–396 551.594.18:551.576.1

Chalmers, J. Alan (*Reader in Physics, Durham Colleges, Univ. of Durham*), **The electricity of nimbo-stratus clouds.** *Conference on Atmospheric Electricity, 2nd, Portsmouth, N. H., May 1958, Proceedings*, issued **1958.** p. 309–315. 2 figs., 10 refs. **DWB** (M(055) C748pr) Electrical effects undoubtedly occur in connection with nimbostratus (continuous precipitation) clouds, but these are much less intense than those associated with cumulonimbus (thunderstorm) clouds and are therefore less easily investigated. In consequence less is known about the electrical structure of nimbostratus clouds than of cumulonimbus. The electrical structure of nimbostratus clouds is not only of interest in itself, but the results obtained may also have some bearing on the problems of charge separation in cumulonimbus clouds. The signs and magnitudes of the charge separations required to account for the phenomena of the nimbostratus cloud can be compared with those of the cumulonimbus cloud, and it will then be possible to determine whether or not the same processes might be operative in both types of cloud; from this, some help may be gained in distinguishing between some of the processes which have been suggested. *Subject Headings:* **1. Electrification of clouds 2. Nimbostratus.** —*Author's abstract.*

11.7–397 551.594.21

*†New Mexico. Institute of Mining and Technology, Soccoro, **Thunderstorm electricity.** [Various reports on the several contracts under which this Thunderstorm electricity project functioned, as follows:] Contract W-36-039: **Special Report,** July 1–Dec. 31, **1946.** 21 p. 4 figs., 6 plates, 5 tables, 8 refs. **Report** No. 3: Progress Report, July 1–Sept. 30, **1947.** 3 p. **Report** No. 5; Progress Report, Jan. 1–March 31, **1948.** 18 p. 6 plates, 5 figs., 5 refs. **Final Report,** Sept. 30, **1948.** 27 p. 7 figs., 7 plates, 2 tables, foot-refs. Project DA 3199-07-022: **Report** No. 2; Progress Report, Feb. 15–May 15, **1949.** 23 p. 3 figs., 4 refs. **Report** No. 3; Progress Report, May 15–Aug. 15, **1949.** 21 p. plate, 4 refs. **Report** No. 4; Progress Report, Aug. 15–Nov. 15, **1949.** 43 p. 4 plates, 2 figs., table, 6 refs. **Progress Report,** Nov. 15, 1949–Feb. 15, **1950** (*see* 6F–204). **Report** No. 6; Progress Report, Feb. 15–May 15, **1950.** 26 p. plate, 4 figs., table, 6 refs. **Report** No. 7; Progress Report, May 15–Aug. 15, **1950.** 6 p. **Final Report,** Nov. 15, 1948–Dec. 15, **1950** (which is also called Final Report, 1951). 50 p. appendices. plates, figs., refs., tables. **Final Report,** Dec. 15, 1950–May 6, **1951.**

9 p. 2 plates, 7 figs. all typescript. **Report** No. 1, Progress Report, May 6–Dec. 1, **1951.** 24 p. plates, figs., refs. **Report** No. 3; Quarterly Report, period ending Feb. 7, **1952.** 8 p. 2 figs., refs. **Report** No. 4, Quarterly Report, period ending May 7, **1952.** 29 p. 5 figs., refs., eqs. **Report** No. 5, Quarterly Report, period ending Aug. 7, **1952.** 9 p. photos, 5 refs. **Report** No. 1; Quarterly Report, period ending Aug. 7, **1953.** 26 p. 4 figs., 12 refs. **Report** No. 2; Quarterly Report, period ending Nov. 7, **1953.** 15 p. fig., plate, 5 refs. **Report** No. 3; Quarterly Report, period ending Feb. 7, **1954.** 7 p. plate, 3 refs. **Report** No. 4; Quarterly Report, period ending May 7, **1954.** 15 p. 2 figs., 10 refs. **Report** No. 5; Quarterly Report, period ending Aug. 7, **1954.** 16 p. 4 figs., plate, 3 refs. **Report** No. 6; Quarterly Report, period ending Nov. 7, **1954.** 29 p. 11 figs., 2 plates, 8 refs. **DWB** (M94.21 N532ta). Also: **Compendium of thunderstorm electricity.** (Unnumbered Report), Oct. 8, **1954.** Project DA-3-99-07-022. 100 p. 20 figs. and photos, tables, 113 refs. **DWB** (M94.21 N532co)—This voluminous series of reports contains accounts in considerable technical detail, of work directed by E. J. Workman with the objective of studying mechanics of electrical charge production and separation within thunderstorms. The numerous projects undertaken to this end included measurements in cumulus clouds, laboratory experiments for studying phenomena accompanying the freezing of water, cloud contamination experiments, etc. The specialized instruments developed for the field and laboratory measurements are described and shown in photographs and diagrams. Cloud and radar-scope photographs are presented. Results of the measurements are presented mostly in graphical form. Particular problems investigated were time of rise and fall of cumulus cloud tops, effect of chemical substances, structure, relationship between glaze ice and initial thunderstorm discharges, precipitation processes in thunderstorms, effectiveness of various substances as freezing nuclei, lightning structure, phenomena attending phase transition, electrical conductivity of ice, and many others. The techniques used include radar observation, cloud and lightning photography, potential gradient recording, sferics direction finding and various laboratory techniques. In the **Compendium of thunderstorm electricity,** S. B. Reynolds presents a systematic survey of knowledge on charge-separation mechanisms and electrical behavior of thunderstorms. He considers in detail the findings of different authors on the life cycles of New Mexico and midwestern storms, thunderstorm cells, initiation of precipitation, growth of hydrometeors, instrumentation for the measurement of electrical properties, determination of charge structure, dipole orientation, radar studies, lightning discharges, the earth's potential gradient, a number of charge separation mechanisms and possibilities of the control of thunderstorm electrification, and many other problems. At the end of the review the basic conclusions are summed up in a few pages and a list of over 100 references is added. *Subject Headings:* **1. Thunderstorm electricity. I. Reynolds, S. E. II. Harrell, J. H., Jr. III. Workman, E. J. IV. Harris, Clyde W. V. Braham, R. R. VI. Harty, John VII. Neill, Howard VIII. Brook, Marx IX. Gourley, Mary.**—*G.T.*

ACOUSTICAL PHENOMENA

See also: **Sonic anemometer obs.** (Businger), 11.7–259; **Sonic anemometer obs.** (Panofsky), 11.7–331.

11.7–398 551.596.1 532.59:534.24

Berzon, I. S., **O nekotorykh spektral'nykh osobennostiakh voln, otrazhennykh ot tonkikh sloev.** [Some spectral characteristics of waves reflected from thin layers.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:641–657, **1959.** 10 figs., 16 refs., 24 eqs. **DWB, DLC**—The author analyzes the spectrum properties of waves reflected from layers for acoustical cases when the fluid layer is situated in a fluid medium with other wave resistances. The analysis is based upon Rayleigh's formula for reflecting stationary waves from thin layers, taking into account multiple reflection within the layer. The analysis was carried out for any angle of incidence of a wave upon the surface of a layer. For cases of normal wave incidence, in which the formulas hold also for solid media, the spectra computed by means of Rayleigh's formula taking into account multiple reflections within the layers are compared with the spectra calculated by the formulas of I. I. Gurvich in which only single reflections from the upper and lower boundaries of the layer were considered. Also the effect of absorption upon the spectra of waves reflected from thin layers both with high and low velocities was

examined. The computational formulas are presented and the results of calculations ar given in graphs. *Subject Heading:* **1. Acoustical wave reflection.**—*I.L.D.*

11.7–399 551.596.1:551.461.

Urick, R. J. and Hoover, R. M., **Backscattering of sound from the sea surface : its measure ment, causes, and application to the prediction of reverberation levels.** *Acoustical Societ of America, Journal*, 28(6):1038–1042, Nov. **1956.** 11 figs., 6 refs. Also: LaCasce, Elroy O. Jr., **Note on the backscattering of sound from the sea surface.** *Ibid.*, 30(6):578–580, Jun **1958.** 3 figs., 12 refs., 4 eqs. **DLC**—This account of measurements of the backscattering o underwater sound from the sea surface includes graphical data on the scattering strength of th ocean surface as a function of grazing angle for different wind velocities. LaCasce, in a further analysis, relates the scattering near normal incidence to the theory of scattering from a sinu soidal surface and shows that scattering patterns for superposed sinusoids indicate the effec of ripples on backscattering. *Subject Headings:* **1. Acoustical propagation 2. Sound trans mission in sea water.**—*G.T.*

PART II. ANNOTATED BIBLIOGRAPHY ON FORECAST VERIFICATION

By: Andrew J. Meglis

INTRODUCTION

This is a selective bibliography on forecast verification. In one sense it is also exhaustive: all material directly on verification which came under scrutiny was included. These were relatively few in number. Since the balance of the material consisted of examples of specific types of verification for particular weather elements (or for a single investigation), it was decided to supplement the works primarily devoted to verification by including: (1) weather elements of all types and their verification, and (2) investigations from as many different geographical locations as possible. A variety of approaches to the subject was thus obtained.

We would like to thank PROF. WILLIAM KRUSKAL from the University of Chicago for his valuable list of suggestions. Some of the directly pertinent works in this bibliography would have escaped notice if PROF. KRUSKAL had not brought them to our attention. We wish also to thank GLENN BRIER of the U. S. Weather Bureau for critical assistance.

Another source was ROBERT HANS MULLER'S bibliography (*item* 11G-28, this bibliography). His summaries were utilized wherever possible. For cases in which his summaries were shortened, or otherwise altered, an asterisk (*) follows his name at the end of the abstract.

Readers may also find additional pertinent material in the following bibliographies which were published earlier in *Meteorological Abstracts:*

Numerical Forecasting (Vol. V, No. 6, 1954; Suppl. Vol. VIII, No. 6, 1957 and Vol. XI, No. 3, 1960)

Forecasting Special Elements (Vol. VIII, No. 3, 1957)

Objective Forecasting (Vol. III, No. 5, 1952)

Long Range Forecasting (Vol. II, No. 2, 1951; also, Vol. IX, No. 7, 1958)

Extended Forecasting (Vol. II, No. 1, 1951)

The scope of subject matter and variety of geographic locations can be seen from the outline which follows.

This bibliography was prepared for, and with partial support from, the Office of U. S. Naval Weather Service.

OUTLINE OF CONTENTS

SUBJECT OUTLINE

GENERAL WORKS

Textbooks, Monographs, and Major Articles
Weightman, Zoch and Byers: 11G–22
Bleeker: 11G–31
Air Weather Service: 11G–39
American Meteorological Society: 11G–70
Bagrov and Morskoĭ: 11G–115
Hašek and Šidák: 11G–143
Koo: 11G–159
Panofsky and Brier: 11G–175
Suzuki: 11G–178
Manuals
Air Weather Service: 11G–135
Martin (Air Weather Service): 11G–146
Bibliographies: 11G–3, –7, –22, –24, –28, –31, –32, –33, –35, –56, –65, –99, –107, –122, –125, –146, –150, –152, –185

WEATHER ELEMENT

Atmospheric Disturbances
Cold waves, 11G–188
Cyclogenesis, 11G–75, –105, –141
Frontogenesis, 11G–75, –105
Snow storms, 11G–45
Storms, 11G–12, –114, –172
Thunderstorms, 11G–19, –62, –81, –93, –133, –148, –162
Tornadoes, 11G–55, –91, –101
Turbulence, 11G–65
Temperature, 11G–25, –29, –34, –39, –58, –67, –69, –73, –74, –80, –81, –97, –102, –106, –109, –119, –128, –133, –138, –142, –145, –156, –158, –164, –173, –174
Critical temperature, 11G–128
Minimum temperature, 11G–2, –9, –102

Wind
Upper air or upper winds, 11G–39, –52, –94, –132, –152, –161, –167, –169, –181, –183, –184
Jet stream, 11G–75 (Riehl and Jenister; Riehl and Teweles), –76, –79
Wind direction, 11G–29, –34, –62, –65, –73, –75, –82, –89, –94, –100, –106, –129, –132, –149, –152, –169, –176, –179, –183, –184
Wind speed, 11G–29, –34, –46, –62, –65, –75, –82, –89, –94, –100, –106, –129, –132, –149, –152, –169, –176, –179, –183, –184

Pressure, pressure centers or pressure areas, 11G–25, –35, –39, –40, –51, –52, –54, –58, –61, –62, –63, –66, –67, –73, –75, –76, 77, –79, –81, –88, –95, –100, –103, –104, –105, –106, –109, –110, –113, –118, –121, –130, –137, –140, –142, –147, –149, –150, –151, –152, –155, –160, –166, –168, –171, –180, –187, –189

Hydrometeors
Aircraft icing, 11G–65
Ceiling height, 11G–25, –29, –64, –65, –106, 145
Clouds, 11G–73, –74, –106, –145, –148
Dew point, 11G–46, –80, –133, –173
Fog, 11G–23, –46, –65, –71
Frost, 11G–1, –3, –7, –9, –10, –11, –18, –19, –20, –21, –32, –50, –128
Humidity, 11G–39
Precipitation, 11G–25, –29, 34, –43, –60, –61, –69, –73, –75, –82, –87, –104, –107, –108, –111, –131, –142, –156, –162, –164, –174
Precipitation runoff, 11G–92
Visibility, 11G–25, –29, –64, –65, –106
Water supply, 11G–112

Miscellaneous
State of Sea, 11G–42
Sunshine, 11G–34, –131
Troposphere, 11G–73

Method, Element, Parameter, etc. being Verified, Studied or Tested

Methods
Beaumont temperature-humidity rule, 11G–96
Brunt's formula, 11G–145
Correlation, 11G–84
Dew point, 11G–1, –21
Donnel formula, 11G–11, –21
Dry and wet bulb thermometers, 11G–21
Extrapolation, 11G–35, –66, –121, –140, –155
Forecasting
Analogue, 11G–39, –48, –63
Baroclinic and barotropic, 11G–189
Cold-wave, 11G–188
Five day, 11G–33, –38, –51, –97, –144, –174
Fog, 11G–46
Jet, 11G–79
Long range, 11G–24, –30, –33, –39, –58 –60, –84, –142, –158, –190
Minimum temperature, 11G–2, –9, –102
Numerical or statistical, 11G–51, –52 –73, –116, –120, –150, –151, –168, –18
Short range, 11G–24, –41, –61, –67, –77 –137
Synoptic, 11G–24, –96, –125, –139
Three day, 11G–161, –163
Thunderstorm, 11G–62, –93, –133, –148 –162
Tornado, 11G–55
Upper air, 11G–181, –184
Isallobaric analysis, 11G–66
Methods reviewed, 11G–143
Multiple regression, 11G–92
Natural synoptic periods, 11G–33, –163
Natural synoptic processes, 11G–163
Numerical, 11G–78
Objective systems, 11G–31, –37, –45, –65 –80, –116, –122, –125, –146, –185
Prognostic charts, 11G–113
Sawyer-Bushby atmospheric model, 11G–8
Semi-objective systems, 11G–31
20% amplitude, 11G–117
Twenty-five forecast rules, 11G–57
Two weather maxims, 11G–87

Method of—
Ångström, 11G–20, –21
Angervo, 11G–40
Artamonov, 11G–138
Baur, 11G–47
Birkeland and Föyn, 11G–119
Bjerknes, 11G–75, –162
Byers, 11G–40
Central Meteorological Observatory (Ja pan), 11G–171
Estoque, 11G–157, –186, –187
Fawbush and Miller, 11G–91
Fjørtoft, 11G–95, –140, –141, –186
Ford, 11G–92
Gandin, 11G–121
Gardner-Scherhag, 11G–101
Gleeson, 11G–154
Holloway and Woodbury, 11G–125
Kammermann, 11G–3, - 7, –18, –21
Lang (dew point), 11G–3
Means, 11G–93
Mikhalevskii, 11G–20, –21
Namias, 11G–161
Petterssen, 11G–35, –40, –66, –76, –140 –160
Priestley, 11G–89
Reed, 11G–186, –187
Riehl, 11G–82, –114, –140
Riehl and Jenister, 11G–75
Rossby, 11G–140
Saunders, 11G–71
Showalter, 11G–93, –101
Smith, 11G–9, –10, - 11, –21
Tokyo Weather Central, 11G–146

U. S. Weather Bureau, 11G–69, –97, –152, –156, –174
van der Bijl, 11G–193
Wadsworth, 11G–147
White and Palson, 11G–147

Element, Parameter, etc.
Air trajectory, 11G–61
Conditions favorable for, or indicative of, low ceiling and visibility, 11G–64
Constant pressure surfaces, 11G–85
Critical temperature of winter wheat, 11G–128
50% rule for surface pressure center displacement, 11G–95
500 mb barotropic tendency computations, 11G–118
500 mb charts, 11G–179
Flow patterns at the 500 mb level in predicting tropical cyclone track, 11G–100
Forecast accuracy or skill, 11G–34, –44, –49, –54, –56, –67, –68, –72, –81, –83, –85 (Haltiner), –86, –98, –99, –106, –110, –115, –123, –124, –125, –126, –127, –132, –142, –151, –152, –164, –169, –173, –185, –191, –193
Forecasts, 11G–5, –17, –19, –25, –27, –31, –36, –43, –44, –49, –69, –85, –89, –90, –105, –108, –111, –117, –119, –129, –131, –132, –134, –135, –136, –143, –153, –155, –159, –160, –164, –165, –169, –176, –177, –178, –180, –183, –187, –191, –192
Daily, 11G–116, –147
500 mb surface height, 11G–149, –160, –167
Monthly, 11G–36, –156
Seasonal, 11G–36, –108, –109, –112, –129, –190
Seven day, 11G–74
Horizontal convergence at 700 mb, 11G–104
Mean trajectory, 11G–35
Namekawa's theory of main and secondary typhoons, 11G–172
Onset of the southwest monsoon, 11G–107
Sea level pressure differences, 11G–104
Steering, 11G–35, –57
Vorticity, 11G–75 (Bruch), –82, –85 (Wobus), –103, –130, –146, –166, –167, –171, –189

Type of Verification

Weighting: 11G–5, –22, –29, –97, –143, –191
Statistical: 11G–19, –26, –30, –36, –39, –44, –54, –58, –62, –75, –86, –94, –98, –107, –113, –119, –136, –137, –142, –158, –167, –175, –183, –193
Correlation: 11G–12, –15, –16, –17, –21, –52, –53, –63, –74, –77, –88, –143, –149, –150, 151
Objective or Numerical: 11G–49, –64, –116, –133
Miscellaneous: 11G–4, –5, –8, –14, –15, –16, –17, –24, –25, –27, –33, –34, –38, –43, –46, –47, –48, –51, –53, –56, –57, –65, –66, –70, –78, –95, –99, –103, –110, –112, –113, –115, –116, –121, –124, –125, –126, –127, –134, –140, –159, –168, –177, –191, –193

Verification Systems Presented or Reviewed

Methods
Contingency tables, 11G–53, –191
Average or root-mean square error, 11G–53
Correlation, 11G–53, –63, –107
IBM, 11G–63, –68, –136
Control-line method, 11G–113
Information theory, 11G–125, –159, –178
Methods reviewed, 11G–143

Methods of institutions
U. S. Air Force, 11G–137
U. S. Air Weather Service, 11G–25, –39, –135
U. S. Weather Bureau, 11G–22, –38, –65, –97, –103, –110, –112, –134, –136, –174
U. S. Signal Office, 11G–5
Practices of foreign meteorological offices, 11G–22
Tokyo Weather Central, 11G–146
U.S.S.R. Hydrometeorological Service, 11G–29
U.S.S.R. Central Institute of Forecasting, 11G–158, –163,–192

Methods of individuals
Clayton, 11G–4, –14, –17
Cooke, 11G–8, –27
Wallén, 11G–12
Walker, G. T., 11G–15
Heidke, P., 11G–19
Brier, 11G–27, –43, –134
Namias, 11G–30
Pagava, 11G–33
Meetham, 11G–34
Hallenbeck, 11G–41
Blot, 11G–42
Brodovitskiĭ, 11G–44
Hoover, 11G–46
Schumann, 11G–49
Gringorten, 11G–56, –70, –122, –123, –124, –194
Kadoya, 11G–58
Kubota, 11G–60
Widger and Palmer, 11G–68
Mook, 11G–70
Hofmann, 11G–74, –156
Riehl, 11G–75
Leight, 11G–77
Treloar, 11G–84
Harding (U. S. Navy. Fleet Weather Central), 11G–85
Bessemoulin, 11G–86
Bushby and Hinds, 11G–88
Crossley, 11G–89
Ford, 11G–92
Fjørtoft, 11G–95
Moyer, Van der Hoven, and Jones, 11G–99, –106

Minnis, 11G–98
Showalter, 11G–101
Eldridge, 11G–104
George, 11G–105
Jones and Moyer, 11G–106
Schroeder, 11G–108
Bagrov and Morskoĭ, 11G–115
Bolotinskaia, 11G–117
Evjen, 11G–119
Franken, 11G–120
Gandin, 11G–121
Jorgensen, 11G–126, –127
Lindquist, 11G–129
Munn, 11G–131
O'Carroll, 11G–132
Thompson, 11G–134
Artamonov, 11G–138
Aujeszky, 11G–139
Hašek and Šidák, 11G–143
Gleeson, 11G–154
Petterssen, 11G–160
Arléry, 11G–165
Berggren, 11G–166, –167, –181
Černava, Kuboš and Pechala, 11G–168
Durst, 11G–169
Mizon, 11G–173
Durst and Johnson, 11G–183
Emslie, 11G–184
Stewart, 11G–188
Vanderman et al., 11G–189
Appleman, 11G–191

Miscellaneous

Factors affecting verification
Long range predictions bear on verificatio
of short range predictions: 11G–6
Weather situation: 11G–78
Psychological factors: 11G–86
Economic aspects of meteorology: 11G–1
–27, –70, –72, –98, –134, –182
Methods for obtaining sufficient materi
for statistical checks: 11G–36
Objectives of forecasting research: how
obtain them: 11G–83
Airline forecasting safety factors: 11G–59
Machine processing or computation: 11G–2
–29, –63, –68, –88, –116, –136, –151
Forecasts and agriculture: 11G–120
Medical meteorological forecasting service
11G–139
Television weather broadcasts: 11G–153
Evaluation of practical forecast problems
11G–154
Check of BBC and newspaper weather fore
casts: 11G–170
"Effective" temperature: 11G–173
Entropy and the information theory: 11G–17

GEOGRAPHIC OUTLINE

Arctic, 11G–114, –187
Asia
Eastern Asia, 11G–146
India, 11G–84, –107
Japan, 11G–45, –60, –157, –171, –172
Takada, 11G–50
North Korea, 11G–80
U.S.S.R. (in Asia)
Ashkhabad, 11G–32
Central Oblasts, 11G–162
Far Eastern Region, 11G–162
Kazakh S. S. R., 11G–162
Sakhalin, 11G–162
Sverdlovsk, 11G–32
Tashkent, 11G–32
Transbaikal, 11G–162
Urals, 11G–162
Western Siberia, 11G–162
Yakutia, 11G–162
Australasia
Australia, 11G–8, –118, –173
Melbourne, 11G–84
New Zealand, 11G–118
Eurasia, 11G–33
Europe, 11G–155
Central Europe, 11G–155, –156, –161
Western Europe, 11G–88, –179
Austria
Vienna, 11G–144
British Isles
Great Britain
England, 11G–71, –96, –153, –170
Kew, 11G–34
Renfrew, 11G–34
Scotland, 11G–45
Edinburgh, 11G–119
Wales, 11G–96
Ireland, 11G–132
Czechoslovakia
Hradec Králové, 11G–148
Germany, 11G–7, –120, –156
Bavaria, 11G–1
Hamburg, 11G–19
Königsberg (Kaliningrad, U.S.S.R.), 11G
19
Hungary, 11G–139
Italy, 11G–66
France, 11G–142
Sweden, 11G–151
Stockholm, 11G–119
U.S.S.R. (European and general), 11G–29
–187, –190
Armenia, 11G–162
Azerbaidzhan, 11G–18, –162
Byelorussian S. S. R., 11G–162
Central Black Earth Area, 11G–162
Estonian S. S. R., 11G–162
Kamennaia Steppe, 11G–20
Latvian S. S. R., 11G–162

Leningrad, 11G–2
Moscow, 11G–162, –164
Northern Caucasus, 11G–162
Privolzhe, 11G–162
St. Petersburg, 11G–162
Ukraine, 11G–162
Upper Volga, 11G–162
Yugoslavia
Pančevo, 11G–148
NORTH AMERICA, 11G–51, –77, –137, –188
Canada, 11G–122
Baffin Land, 11G–188
British Columbia, 11G–188
Nova Scotia
Halifax, 11G–131
United States, 11G–67, –122, –141
Eastern U. S., 11G–23, –55, –57, –65, –85, –147
Alaska, 11G–187
Anchorage, 11G–104
Cordova, 11G–104
Elmendorf, 11G–104
Kodiak, 11G–104
Naknek, 11G–104
Yukon, 11G–188
Arkansas
Little Rock, 11G–61
California, 11G–102
Oakland, 11G–81, –133
San Diego, 11G–9
San Francisco, 11G–65
Santa Maria, 11G–81
Colorado, 11G–92
Denver, 11G–62
Grand Junction, 11G–61
Georgia
Atlanta, 11G–61
Great Lakes, 11G–52, –188
Idaho, 11G–92
Boise, 11G–133
Illinois
Chicago, 11G–93, –103, –108, –188
Louisiana, 11G–64
Maryland
Baltimore, 11G–61
Massachusetts
East Wareham, 11G–10
Mt. Washington, 11G–45
Minnesota
Ely, 11G–61
Minneapolis, 11G–124
Mississippi Valley, 11G–55, –91, –93
Montana, 11G–92
Nebraska
Omaha, 11G–93
Nevada
Las Vegas, 11G–81
New York
Ithaca, 11G–68
Long Island, 11G–56, –124
New York City, 11G–125
Ohio
Dayton, 11G–93
Oklahoma, 11G–91
Oklahoma City, 11G–61
Oregon
Medford, 11G–133
Rocky Mountains, 11G–52, –76, –160
Tennessee
Nashville, 11G–61
Texas, 11G–56, –91, –194
Brownsville, 11G–81
Utah
Salt Lake City, 11G–69
Virginia, 11G–124
Norfolk, 11G–85
Washington (state), 11G–124
Columbia Gorge, 11G–129
Enumclaw, 11G–129
Port Orchard, 11G–129
Quilcene, 11G–129
Walla Walla, 11G–11
Washington, D. C., 11G–38, –61
West Virginia
Elkins, 11G–46
Wyoming, 11G–133
West Indies, 11G–193
SOUTH AMERICA
Argentina, 11G–73
OCEANS AND SEAS
Atlantic, 11G–51, –77, –100
North Atlantic, 11G–42, –63, –88, –94, –179
Gulf of Alaska, 11G–188
Hudson Bay, 11G–188

1887–1892

11G–1 551.509.532

Lang, C., **Welche Zuverlässigkeit besitzt die abendliche Thaupunkt-Bestimmung als Anhaltspunkt für Stellung der Nachtfrost-Prognose?** [How reliable is the evening dew point determination as a basis for night frost forecasting?] *Bavaria. Meteorologische Station, Beobachtungen,* [Reprint?] Vol. 10, **1888.** 24 p. **DLC.** Review in: *Meteorologische Zeitschrift,* 24(3):17–18, March **1889.** 3 tables. A report on verification of the dew point method for frost forecasting, based on observations made in Bavaria 1879–1888 (608 cases). (*Same item as* 4C–8, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Forecast verification 3. Bavaria, Germany.**—*N.T.Z.*

11G–2 551.509.532

*Kersonovskiĭ, B., **Zur Frage über die Vorausbestimmung des Temperaturminimums.** [On the prediction of minimum temperatures.] *Akademiia Nauk SSSR, Meteorologicheskiĭ Sbornik,*

11(6):Sept. 15, **1887.** 15 p. 9 tables. **DLC**—A report on the experimental verification of minimum temperature forecasting methods. These investigations were carried out during 1884–1886 in St. Petersburg by the Central Observatory. (*Same item as* 4C–11, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Minimum temperature forecasting 2. Forecast verification 3. Leningrad, U.S.S.R.**—*N.T.Z.*

11G–3 551.509.532

†*Wollny, Edward, **Untersuchungen betreffend die Methoden der Vorausbestimmung der Nachtfröste.** [Investigations of methods of night frost prediction.] *Forschungen aus dem Gebiete der Agrikultur-Physik*, Heidelberg, 11:133–153, **1888.** numerous tables and refs. **DWB**—A special study to verify the frost forecasting methods of LANG (dew point method) and KAMMERMANN, was carried out during the summer of 1887. It showed the lack of accuracy of the dew point method and gave more satisfactory results with KAMMERMANN's method. The predicted minimum temperature, in most cases, was lower than the observed. (*Same item as* 4C–13, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Forecast verification 3. Kammermann's frost formula.**—*N.T.Z.*

11G–4 551.509.5

Clayton, H. H., **Verification of weather forecasts.** *American Meteorological Journal*, Ann Arbor, Mich., 6(5):211–219, **1889.** table, 3 refs. **DWB, DLC**—It is considered important (1) to determine at what point weather forecasts cease to have any value; (2) to determine what part of their success can be attributed to chance; (3) when they exceed chance successes in the right direction, to give them a proper weight in proportion as they approach the exact facts; (4) to so arrange the material that the weak points of the forecasts are pointed out and thus open the road to improvement. The author presents as his own method a tabulation which shows the number of predictions for each type of weather as well as the number of occurrences. From this table can be seen the per cent of predictions verified and also the number of occurrences that were not predicted. *Subject Heading:* **1. Forecast verification.**—*R. Muller.**

11G–5 551.509.5

Harrington, M. W., **Verification at the signal office.** *American Meteorological Journal*, Ann Arbor, Mich., 6(1):18–21, **1889.** 2 tables. **DWB, DLC**—Rules governing verification, selected from U. S. Signal Office "Instructions," issued Aug. 1, 1888, are presented. The method consists in determining percentages of success by comparing predictions with actual events. Average percentages of verification are worked out by assigning different arbitrary weights to forecasts of different weather elements. *Subject Heading:* **1. Forecast verification.**—*R. Muller.**

11G–6 551.509.5

Hazen, H. A., **The verification of weather forecasts.** *American Meteorological Journal*, Ann Arbor, Mich., 8(9):392–396, Jan. **1892.** **DLC**—A discussion of the general nature of forecasting and verification is presented. The author suggests that proper forecasts should be based on the forecaster's knowledge of the events that have occurred in the past from any given synoptic situation. Reasonable certainties and pure guesses are not included as proper forecasts. It is also suggested that verification take into account, along with other factors, the number of long range predictions made by the forecaster (when verifying his short range predictions) and the time taken by the forecaster in making the forecast. *Subject Heading:* **1. Forecast verification.**—*A.J.M.*

1903–1906

11G–7 551.509.532(431/5)

*†Ziegra, Alfred, **Untersuchungen der "Nachtfrostprognose nach Kammermann" für mehrere meteorologische Stationen Nord- und Mitteldeutschlands.** [Investigation of the "Night frost forecast according to Kammermann" for several meteorological stations of north and central Germany.] *Das Wetter*, 20:158–162, 177–181, 198–208, 226–233, 250–256, July–Nov. **1903.** numerous tables and refs. **DWB**—A study of the accuracy of KAMMERMANN's frost forecasting method. The author gives reduction coefficients to use in this formula for many places in Germany. (*Same item as* 4C–33, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Forecast verification 3. Kammermann's frost formula 4. Germany.**—*N.T.Z.*

11G–8 551.509.5(941)

Cooke, W. E., **Forecasts and verifications in Western Australia.** *Monthly Weather Review and Annual Summary*, Wash., D. C., 34(1):23–24, Jan. **1906.** table. **DLC**—A method of weighting forecasts is presented whereby the forecaster, at the time of forecast, can indicate the degree of certainty that the events predicted have of occurring. The scale of weighting ranges from (5) to (1):

from "virtually certain" to "barely possible." This system would give the general public indications of the reliability of any given forecast since the forecaster must, at times, base his predictions on information which is scanty or relatively inconclusive. Verification figures are given for past trials of this weighting system: the frequency with which each of the numbers (1 through 5) was applied, with the number of times the use of a number turned out to be wrong. The figures indicate excellent results. *Subject Headings:* **1. Weighting of forecasts 2. Forecast verification 3. Western Australia.**—*A.J.M.*

1920–1927

11G–9 551.509.532(794)

Alciatore, Henry F., **New methods of predicting orchard temperatures in the San Diego citrus district.** *Monthly Weather Review, Supplement*, No. 16:70-76, **1920.** 2 figs., 12 tables. **DLC**—A critical analysis of many methods of minimum temperature forecasting at San Diego and a classification of weather situations favorable for frosts. According to verification, the best results were obtained with the formula of J. W. SMITH. The author also determines the relationship between minimum temperatures at San Diego and in the neighboring orchard station. (*Same item as* 4C–101, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting formulas 2. Forecast verification 3. Citrus orchards 4. Smith's frost formula 5. San Diego, Calif.**—*N.T.Z.*

11G–10 551.509.532:634.7

Franklin, H. J., **Cape Cod cranberry frosts.** *Monthly Weather Review, Supplement*, No. 16:20–30, **1920.** fig., 13 tables, 7 refs., eqs. **DLC**—An elaborate report on the experimental verification of different methods for frost forecasting, and especially of SMITH's method, carried out at the Agricultural Experimental Station in East Wareham, Mass. Special observations of pressure, humidity and wind as forecasting factors were used for this purpose. In conclusion, the author discusses the ways to protect bogs from frost. (*Same item as* 4C–105, March 1953 *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Smith's frost formula 3. Forecast verification 4. Cranberry bogs 5. Cape Cod, Mass.**—*N.T.Z.*

11G–11 551.509.532

Garret, Charles C., **Predicting minimum temperatures in the Walla Walla, Wash., Frost-Warning District.** *Monthly Weather Review, Supplement*, No. 16:50–52, **1920.** **DLC**—A modified form of the "Donnel formula" was used for frost forecasting $T = D - \frac{H-40}{4}$ where T is the expected minimum of temperature, H = relative humidity at 6 p.m., D = dew point at 6 p.m. A verification, carried out during two winters (1917 and 1918), showed that the minimum was the same as estimated on 5 nights, higher than the estimated on 25 nights and lower on 16 nights. An application of SMITH'S formula to the observations of the same 46 nights indicated that the observed minimum was the same as estimated by the formula for 5 nights, the observed minimum was higher 24 times and 17 times lower than estimated by the formula. The greatest differences between the actual and the estimated minimum were ±9°. A difference of 4° or less was recorded 29 times out of the 46 nights. The Walla Walla district is especially favored by dynamically heated winds from several directions. (*Same item as* 4C–107, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Minimum temperature forecasting 2. Frost forecasting formulas 3. Forecast verification 4. Walla Walla, Wash.**—*N.T.Z.*

11G–12 551.509.5:551.509.58

Wallén, A., **Sur le contrôle des annonces des tempêtes.** [Verification of storm warnings.] *Geografiska Annaler*, 3(3): 267–277, **1921.** 4 tables, fig., 7 refs., eqs. **DLC**—This paper deals with the verification of storm warnings which are sent out if the wind force on the sea within a radius of 50 nautl mi of the station is expected to exceed 7 Beaufort within a certain predetermined period after the warning. Four characteristic values—P_1 = probability of warning in case of storm, P_2 = probability of warning without storm, P_3 = probability of storm in case of warning, P_4 = probability of storm without warning—may serve as an adequate measure of the accuracy of forecasts. Using these values the coefficient of correlation (R) can be calculated as follows:

$$R = \frac{1}{100}\sqrt{(P_1 - P_2)(P_3 - P_4)}.$$

The author calculates these values and (R) for several stations and claims that this method enables him to compare the quality of forecasts of different stations and different years. *Subject Headings:* **1. Forecast verification 2. Storm warnings.**—*R. Muller.**

11G–13 551.509.5:656.1

Billham, E. G., **A problem in economics.** *Nature*, London, 109(2733): 341–342, March 1922. 4 eqs. **DLC**—A brief discussion of the economic applications of meteorology, using, as an example, forecasts of ground temperature in regard to expenditures for protecting newly-laid concrete road surfaces. Three possible courses of action exist: (1) take precautions only on occasions when phenomenon is forecast, (2) take precautions on all occasions, and (3) take no precautions at all. The circumstances under which (1) is the most economical line of action is of interest. If a = cost of precautions against an event whose probability is (P) and which will cause damage (b) if it occurs in the absence of precautions; and p = probability that an occurrence of the event will be preceded by a forecast of "Yes," (i.e., that the event is predicted), then the cost of (1) through (3) is determined as follows: (1) $aPn+bPn(1-p)$, (2) an, (3) bPn. Comparing the amounts involved, for (1) to be more economical than (3): $bPnp-aPn>0$, or $p>a/b$; and for (1) to be more economical than (2): $bPn(1-p)<an(1-P)$, or $1-p<(1/P-1)a/b$. It is found that with low probability of an event's occurrence, (1) gains in economic advantage. *Subject Headings:* **1. Economics of weather forecasts 2. Frost protection of roads.**—*A.J.M.*

11G–14 551.509.5

Clayton, H. H., **A method of verifying weather forecasts.** *American Meteorological Society, Bulletin*, 8(10): 144 146, **1927. DWB, DLC**—It is suggested that the procedure for verification be conducted as follows: (1) During the period covered by the forecasts obtain the percentage of frequency of occurrence of the predicted event during the intervals for which forecasts of the event were made. (2) During the same period obtain the percentage of frequency of occurrence of similar events during intervals of equal length for which no forecasts were made. If the same forecast is made for every day of the period, determine the expectancy of the event from climatic data, or from observations at the same season in preceding years. (3) The difference between the percentage obtained by processes (1) and (2) represents skill in forecasting and is called the percentage of skill. *Subject Headings:* **1. Forecast verification 2. Forecasting skill.**—*R. Muller.**

1932–1939

11G–15 551.509.33:519.2

Savur, S. R. and Rao, S. Gopal, **Tables extending Walker's criteria for finding the chance of success of a forecast.** *India. Meteorological Dept., Scientific Notes*, 4(59):31–39, **1932.** 2 tables. **DWB**—In *India. Meteorological Dept., Memoirs*, 21(9):13 15, **1914,** G. T. WALKER published tables for picking out significant correlation coefficients or periodicities. These are extended. Table I gives 50% and 5% values of greatest of M accidental correlation coefficients and periodicities, $M=2$ to 1000. Table II gives probability that unpredictable part of an element forecast does not fall below a given value for various correlations. Useful for checking significance of forecasting formulas. (*Same item as* 2B 114, Feb. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Correlations 3. Forecast verification.**—*C.E.P.B.*

11G–16 551.509.33:551.513.7

Sellick, N. P., **Seasonal foreshadowing by correlation.** *Royal Meteorological Society, Quarterly Journal*, 58(245):226 228, July **1932.** 2 tables. **DWB**—Shows that many of the high correlations used in foreshadowing disappear when additional data are analyzed, the frequency distribution of the changes not differing much from that of random series treated in the same way. Recommends tabulating errors of regression equation forecasts to use in the search for additional factors. (*Same item as* 2B–115, Feb., 1951, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Correlations 3. Forecast verification.**—*C.E.P.B.*

11G–17 551.509.5

Clayton, H. H., **Rating weather forecasts.** *American Meteorological Society, Bulletin*, 15(12): 279–283, **1934.** 2 tables, eqs. **DWB, DLC**—The formula for rating is as follows:

$$V_1=\left(\frac{o_1}{a_1}-\frac{o_2}{a_2}\right)\times 100$$

where V_1 = skill in forecasting one weather element, o_1 = frequency of occurrence of the condition when predicted, o_2 = frequency of occurrence when not predicted, a_1 = number of forecasts, a_2 = number of equal intervals of time for which the condition was not predicted. This formula applies only to discrete phenomena where occurrence and non-occurrence can be stipulated (e.g., thunderstorms, fogs, rain, cloudiness). Continuous elements such as temperature, wind velocity, and wind direction can best be judged by some correlation coefficient, properly weighted by the range chosen for verification. (A mathematical explanation of CLAYTON's formula by A. F. SPILHAUS is appended to the article.) *Subject Headings:* **1. Forecast verification 2. Forecast evaluation.**—*R. Muller.**

11G–18 551.509.532

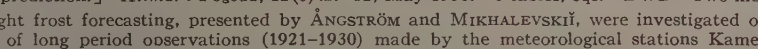
Banashvili, I. A., **K voprosu o metodike predskazaniia zamorozkov.** [Frost forecasting methodology.] *Sovetskie Subtropiki*, Moscow, 2(10):76–78, Oct. **1935.** table. **DLC** (S13.S9)—A report on the results of the verification of KAMMERMANN'S method of frost forecasting in Azerbaidzhan. This method, if used with KOROSTELEV'S correction, can give an 85% accurate forecast. Special reduction values developed for 7 basic points of the area are presented. (*Same item as* 4C 180, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Forecast verification 3. Kammermann's frost formula 4. Azerbaidzhan S.S.R.**—*N.T.Z.*

11G—19 551.509.5

Heidke, P., **Ergebnisse einer objektiven Prüfung von Wettervorhersagen.** [Results of an objective test of weather forecasts.] *Meteorologische Zeitschrift*, 52:487–490, **1935.** 3 refs., table, eqs. **DLC**—The general formula for the success of forecasts is given as:

$$E = \frac{\Sigma r_1 + pi}{\Sigma (r_1 + s_1) p_1} \quad (i = 1, \ldots n)$$

where r_1 = number of correct forecasts, s_1 = number of incorrect forecasts, p_1 = weight. The statistical forecast most suitable for purposes of comparison is the persistence forecast that the weather in each forecast period will be the same as it was in the equally long period just preceding the issuing of the forecast. The success of such a statistical forecast (B) is calculated in the same fashion as E. The relationship between E and B is given by the formula $G = \frac{E-B}{1-B}$, which can also be shown geometrically as follows:



The success E equals $AW:HZ$, and B equals $AH:AZ$. The quality of a forecast is $G = HW:HZ$. Thus, whereas E and B have A as their point of reference, G has H as its point of reference. Following the theoretical discussion the author presents his verification of frost and thunderstorm forecasts at Hamburg and Königsberg. *Subject Heading:* **1. Forecast verification.**—*R. Muller.**

11G–20 551.509.532

Bandorina, A. K., **Proverka metodov predskazaniia zamorozkov.** [Verification of methods of frost prediction.] *Klimat i Pogoda*, 12(3):29–32, May **1936.** 5 tables, eqs. **DWB**—Two methods of night frost forecasting, presented by ÅNGSTRÖM and MIKHALEVSKIĬ, were investigated on the basis of long period observations (1921–1930) made by the meteorological stations Kamennaia Steppe No. 2 and No. 4 (Voronezh Oblast). Better results were obtained with ÅNGSTRÖM'S formula which permits the application of observations at 1 p.m. (*Same item as* 4C–185, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Ångström's frost formula 3. Mikhalevskiĭ's frost formula 4. Forecast verification 5. Kamennaia Steppe, U.S.S.R.**—*N.T.Z.*

11G–21 551.509.532

Uspenskiĭ, E., **O mestnom prognoze nochnykh zamorozkov.** [Local forecasting of night frosts.] *Meteorologiia i Gidrologiia*, 4(2):69–78, Feb. **1938.** 6 tables, 14 refs. **DLC**—A report on empirical investigations of methods used for frost forecasting. The author gives a brief description of the following methods: dry and wet bulb thermometers, dew-point, KAMMERMANN'S, SMITH-DONNEL'S, ÅNGSTRÖM'S and MIKHALEVSKIĬ'S and establishes the correlation coefficients and the probable errors for every method and for various seasons. (*Same item as* 4C–218, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Forecast verification.**—*N.T.Z.*

11G–22 551.509.5

†Weightman, R. H.; Zoch, R. T. and Byers, H. R., **Forecast verification.** Report to the Chief of the Weather Bureau by the Special Committee on Forecast Verification appointed March 8, **1939.** Wash., D. C., U. S. Weather Bureau. July **1939.** 44 p. tables, eqs. Typescript. **DWB**—The report covers: (1) a review of the verification practices of the Weather Bureau, which generally used the method of assigning points to forecasts in accordance with the degree to which they were correct or incorrect; (2) a review of the literature, covering 37 items; (3) a survey of verification practices in foreign meteorological offices. In addition, some comments are made on the purpose of verification; several formulae are worked out and applied to actual forecasts in an experimental way. The report includes a number of concrete recommendations with regard to possible improvements in verification practices of the Weather Bureau. *Subject Headings:* **1. Forecasts verification 2. U. S. Weather Bureau.**—*R. Muller.**

1941–1945

11G–23 551.509.55:551.575

George, J. J., **On the technique of forecasting low ceilings and fogs.** Atlanta, Eastern Air Lines, Meteorological Dept., Jan. 31, **1941.** 13 leaves. 6 figs., 2 tables. Mimeo. **DWB**—Notes on the general concepts of fog classification, occurrence and forecasting based on synoptic charts and nomograms (the latter for determining time of formation based on experience at a given place). Fog formation for 20 places in the eastern U. S. was studied and charts presented to show type of fog and season of occurrence. An analysis of the causes of forecast errors shows that 70% of such errors could be avoided by careful study of cause of error. (*Same item as* 2.5–37, May 1951, *Met. Abstracts.*) *Subject Headings:* **1. Fog forecasting 2. Objective forecasting 3. Forecast verification.** —*M.R.*

11G–24 551.509.5

†Omshanskiĭ, M. A., **Evoliutsiia uspeshnosti sinopticheskikh prognozov pogody.** [Evolution of effective synoptic weather forecasting.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog. i. Geofiz.*, No. 3: 161 172, **1943.** 9 tables, 13 refs. **DWB, DLC.** Transl. into English by Alexander G. Alexeeff issued as *U. S. Air Force, Library Translation*, No. 285. 25 p. Carbon of typescript. 9 tables, etc. Transl. available **DWB**(M09.5 056)—The present article is a discussion of the question of whether or not there was an increase in the effectiveness of synoptic weather forecasting over a long period of time. A study of the data on the methods of short range forecasting used since 1875 led to the conclusion that their effectiveness had increased during the periods of 1875 to 1880, and 1925 to 1940. With respect to long range forecasting, the problem has arisen of the establishment by means of objective criteria, of the very fact of increase in effectiveness. Preliminary investigations of individual methods of long range forecasting show that in many cases these methods have proved to be of doubtful effectiveness. The importance of the problem of correct organization of the checking of forecasts is emphasized in the present article. *Subject Headings:* **1. Synoptic forecasting 2. Long range forecasting 3. Forecast verification.**—*Author's abstract.*

11G–25 551.509.5:551.509.31:681.177

U. S. Air Weather Service, **Short range verification program.** Its *Report* No. 602, Nov. **1943.** 31 p. 7 tables. **DWB**—A new method of verification was devised (by Lt. M. J. Slonim) in the Verification Section of the Army Air Forces, after it was found that other methods involved too many computations for a large-scale program and yielded incommensurable results for different weather elements, making a single final score for purposes of ranking unobtainable. The new method, applied to forecasts of pressure, temperature, ceiling height, visibility and precipitation, takes account of the difference between forecast and observed values of a given weather element. Difficulty is defined in terms of deviations from climatological normals. The verification procedure of the Army Air Forces is outlined. This method of verification lends itself to punch-card processing and has been applied to an average of 3000 forecasts a week during the first 20 weeks of its use in 1943. *Subject Headings:* **1. Short range forecasting 2. Forecast verification 3. Punched card applications to forecast verification.**—*R. Muller.**

11G–26 551.509.5

Brier, Glenn, W., **Skill in selecting the "best" forecast.** *U. S. Weather Bureau, Research Paper*, No. 11:70–71, Jan. **1944.** 2 tables. **DWB**—A statistical method of testing selection of best of three forecasts. (*Same item as* 2A–128, Jan. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Extended forecasting.**

11G–27 551.509.5:519.2

Brier, G. W., **Verification of a forecaster's confidence and the use of probability statements in weather forecasting.** *U. S. Weather Bureau, Research Paper*, No. 16, 10 p. Feb. **1944.** 2 figs., 7 tables, 3 refs. **DWB**—The author suggests that (1) the scientific and economic (or military) value of weather forecasts can be enhanced by increased use of probability statements, and (2) the verification problem (both scientific and economic) can be simplified if forecasts are stated in terms of probabilities. Detailed tables and examples, all covering a five month period in 1942, are presented in support of the author's view (as stated above). The author's use of probability for forecasting is somewhat similar to that suggested by Cooke (*see item* 11G–8): the forecaster rates the chances of an event's occurrence at the time of prediction. These probability ratings are subsequently subject to verification. *Subject Headings:* **1. Forecast verification 2. Probability forecasting.**—*A.J.M.*

11G–28 551.509.5:551.509.31

†Muller, R. H., **Verification of short-range weather forecasts (a survey of the literature).** *American Meteorological Society, Bulletin*, 25(1,2,3):18–27; 47–53; 88–95, Jan.–March **1944.** **DWB**—In a

survey of literature on short range forecasting, 55 items were finally selected as important enough to warrant summarization. The articles range in length from less than a page to nearly a hundred pages. Of the articles summarized, 22 are in English, 26 in German, 3 in French, 2 in Dutch, 1 in Russian, and 1 in Danish. Dates of the articles range from 1884 to 1943; half were published before 1913, the other half after 1920. An introduction is given, serving as an overall view of the writings on verification of short range forecasts and also as a guide to the more detailed summaries which appear chronologically arranged in the second section. *Subject Headings:* **1. Short range forecasting 2. Forecast verification.**—*From author's abstract.*

11G–29 551.509.5(02)

*[U.S.S.R. Gidrometeorologicheskaia Sluzhba Krasnoĭ Armii], **Instructions for recording and evaluating short term weather forecasts, chapters 3–4.** Transl. of the original Russian, issued as *U. S. Office of Naval Operations. Intelligence Division, Intelligence Report,* 73-44, Dec. 16, **1944.** 21 p. 27 tables. Hectographed. Unclassified. **DWB**—A detailed set of instructions for use by forecasters for entering observed elements, forecast elements and for verifying forecasts of temperature, precipitation, visibility, cloud height, wind direction and speed, weather phenomena, the synoptic situation, etc. Various weights (0–10) are given for various degrees of success or failure depending on the wording of the forecast. The objectives of verification, and methods of computing and reporting the scores are clearly stated, area forecasts are verified by using either control stations or averages. No uniform verification system had hitherto been employed throughout the U.S.S.R. The scheme is designed for machine tabulation and computation at the Central Office of the G.G.S. *Subject Headings:* **1. Forecast verification 2. Computer programs 3. Forecast manuals.**—*M.R.*

11G–30 551.509.5-551.509.33

Namias, Jerome, **Effect of experimental error on the verification of prognostic temperature and precipitation anomalies.** Feb. **1945.** 7 p. table, 4 figs., eqs. Carbon of typescript. **DWB** (M09.5 U587e)—The verification of long range forecasts is tested in the U. S. Weather Bureau by a formula which gives S (skill) $=0$, if only a chance distribution is achieved and $S=100$, if no errors were observed. The average skill in past forecasts ranged from 10 to 20%. An experiment extended over 12 selected months showed that even an analysis of observed data by 3 persons gave a "skill" factor of 75% and not 100%. A new scoring system is suggested. *Subject Headings:* **1. Long range forecasting 2. Forecast verification 3. United States.**—*A.A.*

1946–1947

11G–31 551.509.5:016

†Bleeker, W., **Verification of weather forecasts.** *Netherlands. Meteorologisch Instituut, Mededeelingen en Verhandelingen, Ser. B,* 1(2), **1946.** 23 p. tables, 70 refs., 2 figs., eqs. **DLC**—An examination of the methods for verifying weather forecasts is the main object of this work. This is preceded by a discussion of (1) objectivity and subjectivity in regard to forecasts and (2) the need for forecast verification. The methods of verification are divided into four groups: (1) Objective systems constructed for meteorological elements for which in the forecasting terminology only two alternative are given. (2) Objective systems which are suitable for meteorological elements for which three or more forecasting terms are available. (3) Objective systems which are constructed for meteorological elements which are expressed in numerical values in the forecasts. (4) Semi-objective methods. The important features of these systems are discussed, including, where necessary, equations pertinent to the system discussed. A bibliography containing 70 items divided into four subject groups is given; dates of the items range from 1884 to 1942. Appended is a descriptive table of group (1) of the above-mentioned methods of verification. *Subject Headings:* **1. Forecast verification 2. Bibliography on forecast verification.**—*A.J.M.*

11G–32 551.509.532

†Liutershteĭn, I. G. and Chudnovskiĭ, A. F., **Formula dlia prognoza nochnogo khoda temperatury vozdukha i prognoza radiatsionnykh zamorozkov.** [Formula for the prediction of the course of air temperature at night and of radiation frosts.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. i Geofiz.,* 10(3):247–264, **1946.** 2 figs., 10 tables, 18 refs., 70 eqs. English summary p. 264. **DLC**—An analysis of processes which accompany radiational cooling of the air layers near the ground. The relation between principal factors which form these processes are expressed by many formulas. The formula for radiation frost forecasting, verified in Tashkent, Ashkhabad and Sverdlovsk, proved to be successful in 70–90% of all cases. (*Same item as* 4C–264, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Frost forecasting 2. Forecast verification.**—*N.T.Z.*

11G–33 551.509.33

§†Pagava, S. T., **Osnovy sinopticheskogo metoda dolgosrochnykh prognozov pogody maloĭ zablagovremennosti.** [Fundamentals of the synoptic method of long range weather forecasting a

short period in advance.] *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, Trudy Nauchno-Issledovatel'skikh Uchrezhdeniĭ, Ser.* 2, *Sinopticheskaia Meteorologiia*, No. 20, **1946.** 76 p. 45 figs. (including synoptic charts), 19 tables, 58 refs. **DWB**—In the first part of this monograph the author discusses the history of long range forecasting in the U.S.S.R. as started in 1909 and continued under MULTANOVSKIĬ (1913–1941) and later by others at the Institute in Leningrad. He reviews the application of the concepts of "Natural synoptic periods," "Axes" and "Hearths" or "Centers of Action" along which air masses move or are transformed. Three pages are devoted to a report on methods used in the U. S. from 1908 to 1942 under the influence of MITCHELL, ROSSBY, NAMIAS, HOLZMAN, KRICK, ELLIOT and others, and of methods used in Germany by BAUR (1929–date) and critiques of the American, German and Russian systems by SCHELL and others. Then he goes into greater detail, supported by schematic or actual synoptic and composite charts for Eurasia, concerning the application of the concept of natural synoptic periods in analysis, forecasting and verification of 4000 forecasts, using 500 mb topography and tendency charts. A chapter on verification of the short period (5-day) forecasts based on this system compared with "control" forecasts based on climatology or "persistence," gives in tabular form the results, showing some degree of skill. The three page bibliography shows fairly complete knowledge of the domestic and foreign literature up to 1944; the latest publication referred to being a manuscript by I. A. KIBEL' on the application of his second approximation to forecasting, dated 1945. The author claims improvement over methods of MULTANOVSKIĬ, on whose work most of this report is based, by the introduction of "Advective-Dynamic" or "Aerosynoptic" analysis concepts: in other words, by using charts of baric topography and isallohyps charts for natural synoptic periods. The work ends with the statement that it is necessary to improve the quality of the aerological observations before it will be possible to perfect a method of quantitative long range forecasting. (*Same item as* 1.2–54, Feb. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Synoptic analysis 3. History 4. U.S.S.R. 5. United States 6. Germany.**—*M.R.*

11G–34 551.509.5(421)

Meetham, A. R., **Weather forecasts and the ordinary citizen.** *Weather*, London, 2(1):44–49, Jan. **1947.** 2 tables, eqs. **DLC**—A simplified scheme is outlined for practical measurement of forecast accuracy using the Air Ministry's Daily Weather Forecast, but adaptable for use with any forecast. Observation of rain, sun, temperature, and wind between 9 h and 21 h G.M.T. is all that is used in the forecast index. The system of marking (grading) is discussed in detail. The monthly totals of these marks are used in the index (I): $I=(F-L/P-L)\times 100$, where F = total marks of the forecast, P = total marks possible, L = total marks of Lazy Man's forecast (i.e., forecasts, which are the same as that for the previous day). An example is given using forecasts for Kew and Renfrew during June through November 1936 and 1946. The index showed forecasting accuracy significantly higher at Kew. *Subject Headings:* **1. Forecast accuracy 2. Forecast evaluation 3. Kew, Eng.** —*A.J.M.*

1948–1949

11G–35 551.509.5:016

†California Institute of Technology, **Evaluation of forecast aids** [and] **World-wide weather studies.** Contract AF W28-099 ac-430, Preliminary Progress Report, May 28, **1948.** 18 p. 2 figs., refs. Also: **Final Report,** Aug. 15, **1948.** 99 p. 40 figs., 10 tables, biblio. p. 63–99. **DWB**—The initial work involved the preparation of a card file and bibliography resulting from a preliminary literature survey, and the compilation of results of answers to a questionnaire received from 900 forecasters, to help in evaluation of forecast aids for 12 hour movements of highs, lows and wave crests. The aids tested for Sept.–Nov. 1947 were: 1) the steering method, 2) extrapolation method, 3) PETTERSSEN'S method, 4) mean trajectory method. For steering, the 700 and 500 mb levels were found to be more indicative than the 850 mb or 300 mb levels. Results are given in detail and a list of 500 references divided into 5 categories is included. (*Same item as* 3.1–53, Jan. 1952, *Met. Abstracts.*) *Subject Headings:* **1. Forecast aids 2. Short range forecasting 3. Objective forecasting 4. Bibliographies on forecasting.**—*M.R.*

11G–36 551.509.5

Hofmann, Alfred, **Fragen der Mittel- und Langfristvorhersage.** [Problems of medium and long range forecasting.] *Wetter und Klima*, 1(7–8):204–210, July–Aug. **1948.** **DWB**—General discussion on form and method of issue of forecasts. Methods are suggested for obtaining sufficient material for statistical checks by breaking down seasonal or monthly forecasts into shorter periods. Practical use of forecasts is also referred to. (*Same item as* 2A–31, Jan. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Weather forecasting.**—*C.E.P.B.*

11G–37 551.509.5

Leight, Walter Gilbert and Sartor, James Doyne, **Verification of objective monthly temperature forecasts.** *U. S. Weather Bureau, Research Report,* [Unnumbered?] Aug. **1948.** 5 p. figs., table,

3 refs. **DWB**—Tests run to determine the usefulness of the objective method for monthly forecasting showed the objective slightly inferior to the subjective approach and neither much better than chance. Research aimed at improving the upper air pattern is urged in lieu of an ambitious program of objective predictions. (*Same item as* 3E–103, May 1952, *Met. Abstracts.*) *Subject Headings:* **1. Objective forecasting 2. Forecast verification 3. Long range forecasting.**—*M.P.K.*

11G–38 551.509.5

Sartor, J. Doyne and Leight, Walter G., **A study of changes made to extended forecast section forecasts by District Forecast Centers.** U. S. Weather Bureau. Extended Forecast Section, July **1948.** 8 leaves. fig., 4 tables. **DWB**—Verification procedures are explained and results shown tabularly. Evidence is that about one third of the 5-day forecasts issued at Wash., D. C., are changed for the better (20% improved, 13% made worse). For all cases the original forecasts were correct 39% and the revised 42% of the time. (*Same item as* 2.9–47, Sept. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Extended forecasting.**—*M.R.*

11G–39 551.509.33

*U. S. Air Weather Service, **Short range and extended forecasting by statistical methods.** Its *Technical Report*, No. 105-38, Feb. **1948.** 202 p. 3 figs., 21 graphs, 2 maps, 37 tables, numerous eqs. **DWB**—Final report on research performed over a period of four years, based on statistical analyses of meteorological and climatological data with a view of developing methods of long range forecasting. Statistical methods and verification procedures are considered first. Then elaborate statistical studies are made of movements of high and low pressure areas, correlation of daily temperatures, pressures, humidity, combination of elements and upper air data. Finally, analogue forecasts are tested in great detail. (*Same item as* 1.11-35, Nov. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Statistical forecasting 2. Extended forecasting.**—*M.R.*

11G–40 551.509.313

Ylinen, J., **On the practicability of extrapolation formulas based on pressure observations in the computation of the movements of pressure centers and fronts.** *Geophysica*, Helsinki, 3:198–206, **1948.** 3 figs., table, 8 refs., 6 eqs. **DWB**—The author discusses the formulas of ANGERVO, PETTERSSEN and BYERS for computing the movement of high and low pressure centers from the distribution of pressure and variation around the center. The accuracy of the formulas was tested by applying them to 52 cases. The divergences between values calculated by the formulas of ANGERVO and PETTERSSEN and observed values are analyzed. Divergences are due to changes of velocity during the forecasting period. Formulas in which changes of velocity are considered give poorer results than simple formulas. A comparison between the results obtained with BYERS' formula and those obtained with the formulas of ANGERVO and PETTERSSEN indicate that the former is slightly better for forecasting pressure centers but is inferior for forecasting fronts. (*Same item as* 1.11–38, Nov., 1950, *Met. Abstracts.*) *Subject Headings:* **1. Synoptic analysis 2. Mathematical forecasting.**—*I.L.D.*

11G–41 551.509.5

Hallenbeck, Cleve, **The weather forecast.** *American Scholar*, New York, 18(2):200–206, **1949. DLC**—The author, who spent years in specialized as well as general forecasting for the U. S. Weather Bureau, states that forecasts for 12–36 hrs in advance for the general public have not improved in spite of advances such as those due to introduction of Norwegian methods of analysis, 3 dimensional concepts and more information on upper air, in >50 yrs, though special short range (<12 hr) forecasts for aviation, etc., are more accurate. Also the 85% accuracy boasted by the weather services is padded by overlapping criteria for success (verification), in borderline cases, and that a 90% success would be >5% better than 85%—it could be 33% better as it would reduce the uncertainty by $\frac{1}{3}$. He suggests more use of confidence ratings by forecaster to let public know probability of forecast being right. *Subject Headings:* **1. Forecast verification 2. Forecast accuracy 3. U. S. Weather Bureau.**—*M.R.*

1950

11G–42 551.509.3(26) 551.556.8:532.593

Blot, C., **La prévision météorologique de l'"Etat de mer."** [Meteorological forecast of the "state of the sea."] *La Météorologie*, 4th Ser., No. 17:19–28, Jan.–March **1950.** 7 figs., table. Summaries in French, English and Spanish p. 19.—A brief, instructive article on *meteohydrography* (the author's term for the science of wind waves at sea). After a discussion of the theory and the parameters to be observed, an example of a forecast made from synoptic charts of the North Atlantic (June 21–22, 1949) is given and the verification discussed. (Same item as 1.11–108, Nov. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Wave forecasting 2. Wind waves 3. Hydrography 4. Marine forecasting.**—*M.R.*

11G–43 551.509.5

Brier, Glenn W., **Verification of forecasts expressed in terms of probability.** *Monthly Weather Review*, 78(1):1–3, Jan. **1950.** 2 tables, 4 refs., 4 eqs. **DWB**—BRIER suggests a new method of verifying forecasts which will force the forecaster to express a sound judgment of the reliability of his rainfall (or other) forecasts by squaring the deviations of the forecast from the observed probabilities. (*Same item as* 1.6 26, June 1950, *Met. Abstracts.*) *Subject Heading:* **1. Forecast verification.**—*M.R.*

11G–44 551.509.5

Brodovitskiĭ, K. V., **Metodika ob'ektivnoĭ otsenki uspeshnosteĭ predskazaniĭ po universal'noĭ shkale.** [A universal scale for the objective checking of the accuracy of forecasts.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. i Geofiz.*, 14(2):171–180, March–April **1950.** 5 eqs. **DLC**—A complicated method for statistical evaluation of forecasts or skill in forecasting, taking into consideration the difficulty or ease of forecasting (for a given place or season), the confidence factor the forecaster places in his forecast (possibly 0.5, probably 0.75, certainly 1.5 and very confident 2.0), and other factors for which the verification can be weighted objectively. (*Same item as* 2.1–55, Jan. 1951, *Met. Abstracts.*) *Subject Heading:* **1. Forecast verification.**—*M.R.*

11G–45 551.509.3:551.578.4

Brooks, C. F.; Conrad, V. A. et al., **Mt. Washington and Blue Hill aids to snowstorm forecasting for Boston.** Blue Hill Meteorological Observatory, Contract Cwb-8120, *Final Report*, 1949–1950, issued Sept. 26, **1950.** 53+leaves. 13 figs., tables, 8 refs. Typescript. **DWB**—Snowstorms which occurred during 12 yrs are analyzed according to seasons and synoptic types 6 hrs in advance, according to depth or intensity of the snowstorm, air flow or temperature at Mt. Washington, etc., and similar analysis made of 5 other years of data to check the reliability of the objective forecasts. As a result of the selection of the proper parameters, high accuracy could be expected for six hour snowfall forecasts. Considerable attention was paid to the correction of temperature and the nature of the relation between surface and free air temperatures on Mt. Washington. Incidental studies were made of the eddies in the lee of Mt. Washington, the mechanism of snowstorms in Japan and Scotland as compared with those in New England, etc. A detailed statistical and graphic study. (*Same item as* 2.1–41, Jan. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Objective forecasting 2. Snow forecasting 3. Massachusetts.**—*M.R.*

11G–46 551.509.3:551.575

Hoover, Robert A., **Forecasting radiation fog at Elkins, W. Va.,** *Monthly Weather Review*, 78(5):75–80, May **1950.** 9 figs., 2 tables, 5 refs. **DWB**—Gradient wind speed, sunset dry-bulb and dew point depression were used as the most indicative parameters in setting up an objective system of forecasting fog at Elkins, W. Va. Nomograms prepared for evaluating conditions and results of tests for verification are presented and discussed. Nine conclusions which might be used as "rules of thumb" are also presented. Effect of topography indicated by charts and diagrams. Fog forms most frequently on clear nights during prevalence of Atlantic air (easterly gradient) in July, August and September, and rarely when the gradient is from north through west to south in winter (continental air). (*Same item as* 1.11–34, November 1950, *Met. Abstracts.*) *Subject Headings:* **1. Fog forecasting 2. Objective forecasting 3. Elkins, West Virginia.**—*M.R.*

11G–47 551.509.33

Loeser, Günter, **94% Treffer in der langfristigen Witterungsvorhersage.** [94% accuracy in long range weather forecasting.] *Umschau*, Frankfurt a.M., 50(8):231–243, April **1950.** 3 refs. **DLC**—Monthly and seasonal weather forecasts for Germany issued by F. BAUR between April 1948 and November 1949 are presented in tabular form and found to have proved accurate in 94% of the cases! Basic principles followed in preparing the forecasts are outlined. Similar forecasts have been published for 27 years in Umschau. (*Same item as* 3.7–74, July 1952, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Forecast verification. I. Baur, Franz.**—*G.T.*

11G–48 551.509.51:551.509.25(7)

Massachusetts Institute of Technology, **Experimental study of visual grading of prognostic pressure maps.** Contract W-28-099-ac-398, Report No. 11, Nov. 1, **1950.** 23 p. tables. **DWB**—In order to avoid the unsatisfactory results obtained by verifying "objectively" prognostic charts by systems of parameters and correlation of these parameters (orthogonal polynomials), a method of visual evaluation by 5 experiments in which 4 meteorologists rated a series of charts was listed statistically. Analogs were first selected on the basis of fronts alone, but the appearance of the entire North American chart was used in grading. Stricter criteria for picking analogs did not improve the agreement between the 4 graders, so improvement in grading methods was attempted by specifying features to be graded, and last by dividing the continent into 4 quadrants and grading

each separately, then averaging grades. This gave better agreement than other procedures. (*Same item as* 3.5–86, May 1952, *Met. Abstracts.*) *Subject Headings:* **1. Prognostic charts 2. Forecast verification 3. Analog selection. I. Wadsworth, G. P.**—*M.R.*

11G–49 551.509.3 551.509.5

Schumann, T. E. W., **The fundamentals of weather forecasting, Part I.** *Weather*, 5(6):220–224, June **1950.** 2 figs., 3 refs., 7 eqs. **Part II, The principle of indeterminancy.** *Ibid.*, 5(7):248–253, July **1950.** fig., 6 refs. **DWB**—Pt. I, proposes a numerical test of accuracy of forecasts by correlation of observed and predicted departures. Discusses possible accuracy of forecasts by various methods, including statistical. In Pt. II, the small uncertainties of quantum mechanics are magnified by secondary effects and limit possible accuracy of forecasts. In opposition to SUTCLIFFE, the author thinks that ultimately a combination of mathematical and statistical forecasting will prove much superior to synoptic forecasting. (*Same item as* 1.9–38, Sept. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Weather forecasting 2. Forecast verification.**

11G–50 551.509.532(52)

Ueki, H., **On the prediction of late frost.** *Journal of Meteorological Research*, Tokyo, 2(8):250–251, July **1950.** 4 figs., 2 tables, 4 eqs. In Japanese; English summary p. (6). **DWB**—Writing t_m = min. air temperature °C, t = temperature at 18 h, d dew point, v vapor pressure (mm at 18 h), author finds at Takada

$$t_m = 0.488t - 4.4$$
$$t_m - d = 1.88v - 8.52.$$

(*Same item as* 2.6–33, June 1951, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Frost forecasting 3. Japan.**—*C.E.P.B.*

1951

11G–51 551.509.33

Aubert, Eugene J., **The application of one-dimensional numerical methods to extended forecasting.** U. S. Weather Bureau, Extended Forecast Section, April **1951.** 27 p. 9 figs., 2 tables, 13 refs., 15 eqs. **DWB**—An attempt is made to determine whether numerical forecasts using the one-dimensional barotropic model of CHARNEY and ELIASSEN could be used to prepare prognostic charts for up to four days in advance. Forecasts were made for North America and the Atlantic for twelve 5-day mean winter cases for the 700 mb level and were compared with routine 5-day mean forecasts and were found to be just as good. Techniques are outlined, formulas derived and illustrative charts included. (*Same item as* 2.11–43, Nov. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Extended forecasting.**—*M.R.*

11G–52 551.511:551.509.313

Bolin, Bert and Charney, Jule (*Princeton, Inst. for Advanced Study*), **Numerical tendency computations from the barotropic vorticity equation.** *Tellus*, 3(4):248–257, Nov. **1951.** 8 figs., refs., 4 eqs. **DWB**—Test computations made for a period of ten days in order to verify usefulness of numerical forecasting. Computational errors discussed. Correlation up to 0.70. Best results in the region of the Great Lakes. Influence of Rocky Mountains on the large scale upper level flow pattern discussed. (*Same item as* 4.8–87, Aug. 1953, and 5F–34 June 1954, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Vorticity equations 3. Forecast verification 4. Great Lakes Region.**—*A.A.*

11G–53 551.509.5

Brier, Glenn W. and Allen, Roger A., **Verification of weather forecasts.** (In: **Compendium of Meteorology.** Boston, American Meteorological Society, **1951.** p. 841–848. 5 tables, 11 refs., eqs.) **DWB**—Purposes of verification are: testing economic value (very difficult), administration (checking ability of forecasters) and scientific (improving methods). Difficulties include degree of objectivity in terminology and specification of a scale of "goodness." Methods summarized are: contingency tables, average or root-mean-square error and correlation. Advantages of forecasts expressed as probabilities are emphasized. Standard of comparison (chance, climatic, etc.) and allowance for difficulty of forecast are discussed. Many points need further investigation. (*Same item as* 3.6–2, June 1952, *Met. Abstracts.*) *Subject Heading:* **1. Forecast verification.**—*C.E.P.B.*

11G–54 551.509.5:551.509.25

*§Bristor, Charles L., **A study of WBAN 30-hour surface prognostic chart errors.** [U. S. Weather Bureau], Oct. **1951.** 20 p. 2 tables, 6 refs., charts (some fold.). In appended folder: set of composite maps. Ozalid reproduction. **DWB**—Statistical study of the errors in the forecast pressure gradients made by 4 forecasters (1948–51) arranged by time of forecast and by the day of duty tour.

Synoptic situations favoring worse prognoses are those where commonly used subjective extrapolation techniques fail. Sample maps are presented. *Subject Headings:* **1. Forecasting errors 2. Prognostic charts. I. U. S. Weather Bureau.**—*A.A.*

11G–55 551.509.327

Fawbush, E. J.; Miller, R. C. and Starrett, L. G., **An empirical method of forecasting tornado development.** *American Meteorological Society, Bulletin*, 32(1):1–9, Jan. **1951.** 6 figs., table, 12 refs. **DWB**—Charts show frequency of tornadoes in eastern United States by months and for year (1920–1949). Relation to elevation and air mass or frontal characteristics, formulated. Situation on May 5, 1950 analyzed in detail. Success of forecasting method outlined herein, shown by verification figures for 1948–1950 seasons. (*Same item as* 2.9–41, Sept. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Tornado forecasting 2. Tornado distribution 3. Mississippi Basin.**—*M.R.*

11G–56 551.509.5

†Gringorten, Irving I., **The verification and scoring of weather forecasts.** *American Statistical Association, Journal*, 46(255):279–296, Sept. **1951.** 10 tables, 18 refs., 24 eqs. **DWB**—The author attempts to show that the rating of forecasts for utility must be kept distinct from rating for skill. In the former case, the rating should be in terms of operational requirements or value of the forecast; in the latter case, the rating should be on the basis of the "forecaster's ability to analyze and classify the antecedent weather so that, within one class, the probability of a subsequent event is increased above or decreased below the relative frequency of that event in all weather situations." Theory is developed in detail and examples given for flying weather classification forecasts at Randolph Field, Tex. or frequency of weather classes at Mitchel Field, N. Y. (*Same item as* 3.5–85, May 1952, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Forecasting skill.**—*M.R.*

11G–57 551.509.5

Harrison, Henry T., **Results of synoptic tests applied to certain forecasting rules.** *American Meteorological Society, Bulletin*, 32(3):89–96, March **1951.** 8 figs., 9 tables, 6 refs. **DWB**—One of the best practical forecast studies produced in the last 35 yrs. Twenty-five forecast rules tested for accuracy and results, based on a score or more of cases for each, are listed. For nine of the cases the results were good enough (78%) to warrant use. Synoptic examples are given in addition to verification (or confidence) score for each. The remaining 16 are divided into two categories, 7 listed as "inconclusive" and 9 are doubtful. The latter cases were no more useful than tossing a coin would be. The best verification (100%) was for steering of cyclones (based on 10,000 ft flow) in the Eastern United States. (*Same item as* 2.10–50, Oct. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Objective forecasting 3. Eastern United States.**—*M.R.*

11G–58 551.509.33:551.509.5(52)

Kadoya, K., **Abstract of the data in long-range forecasting.** *Journal of Meteorological Research*, Tokyo, 3(9):336, July **1951.** 2 tables. In Japanese. **DWB**—Shows example of taking long range forecasts of pressure and temperature deviations and reducing them to quantitative values which can be subject to verification or statistical study. (*Same item as* 9G–8, July 1958, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Forecast verification 3. Statistical studies 4. Japan.**—*M.R.*

11G–59 551.509.3:629.13

Kraght, Peter E., **Problems in airline meteorology.** *New York Academy of Sciences, Transactions*, 2nd Ser., 13(6):251 254, April **1951. DLC**—Under certain conditions, positive forecasts can be made with confidence, but under other conditions, the critical limits are too vague or unpredictable and a positive forecast would be biased in respect to the actual confidence of the forecaster. The uncertainty factor in airline forecasting is usually resolved by a bias in favor of the pessimistic, rather than optimistic, side. Thus, a ceiling forecast would be made, not for the mean or median of possibilities, but for the value which would probably result in a lower ceiling 5% of the time and an equal or higher ceiling 95% of the time. Other safety factors to balance the various uncertainty factors are mentioned. (*Same item as* 3.2–48, Feb. 1952, *Met. Abstracts.*) *Subject Headings:* **1. Airways forecasting 2. Forecast verification.**—*M.R.*

11G–60 551.509.33:551.509.5(52)

Kubota, K., **Statistical study on long-range forecasting.** *Journal of Meteorological Research*, Tokyo, 3(9):333–335, July **1951.** tables, eqs. In Japanese. **DWB**—Shows method and gives example of verification of long range forecasts for wet and dry seasons, etc. in Japan. (*Same item as* 5.6–80, June 1954, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Forecast verification 3. Japan.**—*M.R.*

11G–61 551.509.33:551.509.54.2

Schmidt, Reinhard C., **A method of forecasting occurrence of winter precipitation two days in advance.** *Monthly Weather Review*, 79(5):81–95, May **1951.** 7 figs., 9 tables, 10 refs. **DWB**—Starting with the hypothesis that no winter precipitation will occur in the Washington, D. C.-Baltimore area unless sufficient moisture flows into the area aloft (and vice versa), a single parameter system of forecasting for 48 hrs in advance was tested, giving scores of 86% compared with 68% for official forecasts made at Washington National Airport. The single parameter used was the trajectory of air reaching Nashville, Tenn. at 850 mb level. If the flow was essentially from the NW or SE, no rain, and if from the SSW or S, rain was forecast. To further improve the skill score, certain other parameters were introduced, based on 700 or 850 mb flow at Atlanta, Ely, Grand Junction, etc., as well as Nashville, Oklahoma City, and Little Rock. Independent data were used to verify accuracy and a test made in Jan. 1951, using rules promulgated. (*Same item as* 3.3–68, March 1952, *Met. Abstracts.*) *Subject Headings:* **1. Objective forecasting 2. Precipitation forecasting 3. Washington, D. C.**—*M.R.*

11G–62 551.509.3:551.509.56(788)

Tillotson, Kenneth C., **An objective aid for forecasting September thunderstorms at Denver, Colo.** *Monthly Weather Review*, 79(2):27–34, Feb. **1951.** 6 figs., 12 tables, 6 refs. **DWB**—A general discussion of thunderstorms in the Denver area is followed by a statistical analysis of the occurrence (diurnal and monthly) and persistence of thunderstorm formation, effect of orography, etc. The variables analyzed in constructing an objective formula were: winds in the free air, 700 mb flow, mixing ratio, pressure lapse between condensation and freezing levels and moist instability. The three most successful variables were combined and results tested with 85% of 60 correct, compared to 75% correct for official forecasts. (*Same item as* 2.11–40, Nov. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Objective forecasting 2. Thunderstorm forecasting 3. Denver, Colo.**—*M.R.*

11G–63 551.509.335(261)

U. S. Air Weather Service, **Comparison of analogue selection methods.** Its *Technical Report*, 105-70, April **1951.** 31 p. graphs, tables. **DWB**—An area of the North Atlantic was selected to make an objective analysis of the efficiency of various methods of selecting analogue maps for forecast purposes. Northern Hemisphere Historical Weather Maps were used as a basis, and I.B.M. techniques used to select analogs by means of surface pressures and location of centers of highs and lows. It was found that variance of pressure from day to day gave a higher correlation than did subjective selection of analogs by the forecaster. Correlations of analysis are shown in tables and figures. (*Same item as* 3.9–75, Sept. 1952, *Met. Abstracts.*) *Subject Headings:* **1. Analog selection 2. Statistical forecasting 3. Forecast verification 4. North Atlantic. I. Jones, Rodney A.**—*M.R.*

11G–64 551.509.5:551.576.4:551.591

U. S. Air Weather Service, **Forecasting winter ceilings at Barksdale Air Force Base.** Its *Technical Report*, No. 103-92, July **1951.** 26 p. numerous charts (many fold.), 13 refs. Photostat. **DWB**—An objective forecast study of conditions favorable for, or indicative of, low ceiling and visibility in winter at Barksdale Air Force Base. Data for 445 days (Dec. 1946–50 and Jan. and Feb. 1947/51 inclusive) were used as the sample and Dec. 1943/45 and Jan. and Feb., 1943/46 as the test data. Ascending motion and moisture supply were considered paramount. Direction of flow was also found to be important. The tests indicated that a useful forecast tool had been developed. Charts and scatter diagrams are included. (*Same item as* 6.8–116, Aug. 1955, *Met. Abstracts.*) *Subject Headings:* **1. Ceiling and visibility 2. Objective forecast studies 3. Barksdale Air Force Base, La.**—*M.R.*

11G–65 551.509.5:629.13

†U. S. Weather Bureau, **Meteorological forecasting investigation for improving the prediction of airport acceptance rates.** Prepared by the Short Range Forecast Development section. Project ANDB 4.4, Phase A, Final Report, July 1, **1951.** 2 Pts. **Pt. 1, Summary report.** 7 p. **Pt. 2, Detailed report.** 84 p. 55 figs., 10 tables, 31+7 refs., 8 eqs. **DLC** (TL556.U68 1941)—It is shown that objective methods of forecasting for flying conditions at airports give better verification than conventional methods or climatological expectancy. Special problems involved in forecasting ceiling, visibility, wind, turbulence, aircraft icing and fog at airports in Eastern U. S., and small scale variations of ceiling and visibility (at San Francisco Airport) together with detailed statistical data used in working out objective tools (frequency charts and scatter diagrams) and verification procedure are treated. (*Same item as* 5.8–76, Aug. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Forecast improvement 2. Objective forecasting 3. Airport terminal forecasts 4. Stratus forecasting 5. San Francisco Airport, Calif.**—*M.R.*

11G–66 551.509.25

Visconti, Italo and Urbani, Marcello, **Sulla costruzione delle carte previste.** [Construction of a prognostic chart.] *Rivista di Meteorologia Aeronautica*, 11(1):29–31, Jan./March **1951.** Italian, French, English and German summaries p. 29. **DWB, DLC**—Brief article on the methods used in constructing surface and 700 mb prognostic charts in the forecast section of the Ispettorato Telecomunicazioni e Assistenza del Volo. Four approaches are used: 1) statistics of development of dynamic processes and types of weather, 2) isallobaric analysis, 3) PETTERSSEN's method for speed of propagation of a system, and 4) extrapolation based on past movements. For 700 mb charts, a method of kinematic analysis is used. Results of one year's experiments are tabulated for cyclonic and anticyclonic situations in terms of successful forecasts. (*Same item as* 3.4–74, April 1952, *Met. Abstracts.*) *Subject Headings:* **1. Prognostic charts 2. Forecast verification 3. Synoptic analysis. I. Italy. Ispettorato Telecomunicazioni e Assistenza del Volo.**—*M.R.*

11G–67 551.509.31

Wadsworth, George P. (*M.I.T.*), **Accuracy of short-range forecasting.** Massachusetts Institute of Technology, Division of Industrial Cooperation, Contract AF 19(122)-447, Report No. 2, Aug. 1, **1951.** unpaged. tables, graphs. **DWB**—A statistical study on the accuracy of short range forecasts as a function of the season, the geographical location and the factor of experience of the forecaster. Forecasts were made for eight places in the U. S. under controlled conditions by three meteorologists with experience from five to eleven years, working independently. Error distributions for pressure and temperature are presented in tables and graphs. Good material for more detailed study. (*Same item as* 4.11–73, Nov. 1953, *Met. Abstracts.*) *Subject Headings:* **1. Forecast accuracy 2. Short range forecasting 3. United States.**—*A.A.*

11G–68 551.501.45:551.509.5:37

Widger, William K., Jr. and Palmer, Thomas Y., **A method for using International Business Machines test sheets for student forecasting and verification.** *American Meteorological Society, Bulletin*, 32(8):298–301, Oct. **1951.** fig., 2 tables, 2 refs. **DWB**—The authors, who represent the Dept. of Agronomy, Cornell University, Ithaca, N. Y., explain a simplified way of preparing and grading students' forecast tests by using I.B.M. form I.T.S. 1100 A 151 in conjunction with an I.B.M. test scoring machine. Photographs of a portion of the I.B.M. form and of the scoring machine are presented. The six elements on which data are requested from the students, with 4–15 options on each element, are shown in a table. A table for the penalty system applied is added. (*Same item as* 3.5–36, May 1952, *Met. Abstracts.*) *Subject Headings:* **1. Punched card methods 2. Forecast verification 3. Teaching of meteorology.**—*G.T.*

11G–69 551.509.54 551.509.53(792)

Williams, Philip, Jr., **The use of confidence factors in forecasting.** *American Meteorological Society, Bulletin*, 32(8):279–281, Oct. **1951.** 4 tables, 6 refs. **DWB**—Brief report on precipitation forecasts by the U. S. Weather Bureau at Salt Lake City, in which the estimated probability of occurrence was indicated by the number 6, 8 or 10 (out of 10). Results obtained are shown in tables and claimed to suggest practicability of the method. The same principle is applied to forecasts of maximum or minimum temperature. (*Same item as* 3.5–88, May 1952, *Met. Abstracts.*) *Subject Headings:* **1. Forecast probabilities 2. Forecast verification 3. Salt Lake City, Utah.**—*G.T.*

1952

11G–70 551.509.5

American Meteorological Society. District of Columbia Branch, **Panel discussion on forecast verification.** *American Meteorological Society, Bulletin*, 33(7):274–278, Sept. **1952. DWB**—Various points of view on the goals, principles and procedures of forecast verification were discussed at this forum. G. W. BRIER analyzed the purposes of forecast verification from the economic, administrative and scientific aspects. The verification of forecasts by means of quality control was stressed by C. P. MOOK and various aspects of scoring were discussed by I. I. GRINGORTEN. Comments from participants from the floor are included. (*Same item as* 5.1–90, Jan. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification. I. Brier, Glenn Wilson II. Mook, C. P. III. Gringorten, Irving I.**—*I.L.D.*

11G–71 551.509.34:551.575

Corby, G. A. and Saunders, W. E., **Water-fog point: a further test.** *Meteorological Magazine*, London, 81(962):225–228, Aug. **1952.** 5 refs. **DWB**—SAUNDERS' method of forecasting water-fog point (*see* 1.10–41, Oct. 1950, *Met. Abstracts*) was tested for inland stations in England, Aug.–Oct. 1950, with encouraging results. Apparent failures are discussed; inversions and effect of rain require further research. *Subject Heading:* **1. Fog forecasting.**—*C.E.P.B.*

11G–72 551.509.5

Crossley, A. F., **Usefulness of forecasts.** *Meteorological Magazine*, London, 81(961):193–197, July **1952.** fig., 3 tables, 3 refs., 4 eqs. **DWB**—An expression is given for the "useful effort" of operations based on weather forecasts, in relation to forecast accuracies of occurrence of nonoccurrence of an event. Analyses of 2 types of forecast are given and economic value of forecasts discussed. (*Same item as* 4.5–70, May 1953, *Met. Abstracts.*) *Subject Heading:* **1. Forecast verification.**—*C.E.P.B.*

11G–73 551.509.54.2:551.577.3

Diaz, Emilio Luis, **Una ayuda para la previsión de lluvias.** [An aid for forecasting rain.] *Sociedad Científica Argentina, Buenos Aires, Anales*, 153(5):187–199, May **1952.** 4 figs., 4 tables. **DWB**—Rainfall probability for three climatic regions of Argentina is determined as a function of various meteorological elements measured at 0900 h. The elements considered are: pressure anomaly and tendency, temperature anomaly, wind direction, cloudiness and state of the lower and middle troposphere. Rainfall probabilities are tabulated in conjunction with various values of these elements. Forecasts made on the basis of this statistical method are compared to actual measurements and satisfactory agreement is found. It is believed that such information on rainfall probability will usefully fit into synoptic forecasting practices. (*Same item as* 4.5–74, May 1953, *Met. Abstracts.*) *Subject Headings:* **1. Rainfall probability 2. Precipitation forecasting 3. Argentina.**—*G.T.*

11G–74 551.509.5

Hofmann, Alfred, **Eine Methode zur Prüfung von Vorhersage auf ihre Wissenschaftliche Leistung.** [A method of checking forecasts by their scientific accuracy.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 38:120–123, **1952.** 4 figs., 2 tables. **DWB**—Describes a method of checking forecasts by correlation coefficients between observed and forecast values (7 day forecasts, maximum and minimum temperature and cloud amount). Successful forecasts were due mainly to persistence. (*Same item as* 4.5–72, May 1953, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Extended forecasting.**—*C.E.P.B.*

11G–75 551.509.5(08) 551.509.318

†§Huges, L. A. (*ed.*), **Experiments in quantitative prediction with the aid of upper air charts.** A technical report prepared by members of the 1951 Class in Advanced Synoptic Meteorology. Chicago. University. Dept. of Meteorology, Contract N6ori-02036 [Unnumbered Report], Oct. **1952.** Each section separately paged. figs., refs., tables, eqs. **DWB**—Contents: Defant, F., **A kinematic-graphical method for the 24-hour prognosis of the 500 mb chart.** 7 p. refs., 16 figs. Determination of direction and acceleration of displacement following characteristic points of individual contour lines. Riehl, H. and Jenister, C. O., **A quantitative method for 24-hour jet stream prognosis.** 8 p. 12 figs., 8 refs., 5 eqs. Formula proposed for the propagation (C_i) of isotachs on a constant pressure surface: $C_i = v + g(\Delta h/\Delta v)_s$; v = winds speed; g = gravity acceleration; h = height of a given isobaric surface; s = axis along the streamlines. Computational routine and verification described. Riehl, H.; Norquest, K. S. and Sugg, A. L., **A quantitative method for the prediction of rainfall patterns.** 11 p. 5 figs., 11 refs., 8 eqs. Upward motion in low and middle troposphere when relative vorticity decreases downstream along the streamlines at 300 mb. Probability for precipitation tested on 16 previous weather maps and 14 actual prediction charts. (*See also* 4.5–76, May 1953 and IIG–82, July 1960, *Met. Abstracts.*) Riehl, H. and Teweles, S., **A further study on the relation between the jet stream and cyclone formation.** 11 p. 10 figs., table, 20 refs., eqs. Frontogenesis, cyclogenesis and spread of precipitation occur in the left hand portion of the area downstream from the jet maximum. Synoptic cases and cross-sections of isotachs presented. (*See also* 5.1–208 and 4G–127, *Met. Abstracts.*) Gulick, Y. R., **Some attempts to determine long wave positions by quantitative means.** 6 p. 5 figs. Summarizes practical experience with long wave method. No method maintains reliability during periods of marked changes. (*See also* 8C–139, *Met. Abstracts.*) Bruch, A., **Some trial computations of dynamic instability.** 3 p. table. Test of Y. Bjerknes proposal to use dynamic instability to find regions of frontogenesis and cyclogenesis. Anticyclonic shear of Coriolis parameter measured in isentropic surface, correlated with intensification of surface cyclones. Wolff, P. M., **The behaviour of twenty-four height change patterns.** 5 p. 5 refs. Short account of test of a hypothesis by (Riehl *et al.*) for forecasting procedure. Extrapolation along long-wave pattern suggested. Bruch, A., **Verification of constant absolute vorticity trajectories.** 3 p. refs., table. Statistical tests show poor results for 48 hour periods, good for 24 hours for all speeds and directions tested. Systematic deviation to the right over mountain areas, to the left in the lee. Data tested presented in table. Bromberg, S., **On the prediction of frontal positions.** 3 p. 4 tables. Attempt to find most probable frontal position to be entered on prognostic charts. *Subject Headings:* **1. Objective forecasting 2. Upper air charts 3. Long waves 4. Forecasting symposia**—*A.A.*

11G–76 551.509.312:551.509.317

Johannessen, Karl P. and Cressman, George P. (*Hq. Air Weather Ser., Wash., D.C.*), **Verification of an equation for trough and ridge motion.** *American Meteorological Society, Bulletin*, 33(7):267–270, Sept. **1952.** 5 tables, ref. **DWB**—PETTERSSEN'S equation for the speed of troughs or ridge lines is tested out on 157 troughs and ridges selected from 500 mb charts from the periods Oct. 1, 1950 to March 31, 1951, May 1951 and Dec. 17, 1951 to Jan. 4, 1952, persisting for a minimum of 24 hrs with approximately north-south axis, trough and ridge-lines were defined as lines of maximum streamline curvature. The parameters measured were wave length, latitude, core speed, half width of jet and 24 hr displacement. It was found that 24-hr computed speed gave better results than extrapolation of past motion, that for ridges but not for troughs computed speeds over the Rocky Mountain region were subject to greater systematic errors than those over flatter country. Systematic error at the 500 mb level is less than at 300 and 700 mb levels and it was "found to be small for troughs (<1 long ° per day) but considerable for ridges (+3 to +5 long° per day)", the error scatter was the same for trough and ridges. Results were found to improve when data resembling the model for which formula was derived, were used. (*Same item as* 4.11–79, Nov. 1953, *Met. Abstracts.*) *Subject Headings:* **1. Kinematic analyses 2. Upper air analysis 3. Petterssen, S.**—*I.L.D.*

11G–77 551.509.5:551.509.25

Leight, Walter G. (*Ext. Fore. Sec., U. S. Weather Bur.*), **Experiment in the preparation of 72-hour prognostic 700 mb charts.** Sept. **1952.** 6 p. 2 figs., table, 5 refs. **DWB**—An attempt was made to find an objective method for verification of 72-hr prognostic preparation. Twenty prognostic charts prepared at the U. S. Weather Bureau, Extended Forecast Section between April and Aug. 1951 were verified by using a network of 25 check points (unknown to the forecasters) throughout North America and adjacent waters, and checking the observed heights of the 700 mb surface and the prognostic and observed heights 72 hrs later. Departures from seasonal normals were computed and linear correlation coefficients obtained. The actual forecast anomaly and the persistence anomaly were compared. In 14 out of 20 cases the forecaster did better than persistence, in 5 cases poorer. Successes were only slightly better than persistence. (*Same item as* 4.9–28, Sept. 1953, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Prognostic charts 3. North America.**—*M.R.*

11G–78 551.509.313

Lönnqvist, Olov (*Swedish Met. and Hydrol. Inst.*), **To the comparison between numerical methods and methods now in use for forecasting meteorological charts.** *Tellus*, 4(3):182–200 Aug. **1952.** 5 figs., table, 5 refs. **DWB**—Methods now in common use for making prognostic charts to a large extent are based on time derivatives, while the numerical methods start from space derivatives. That is the fundamental difference between them. It is shown that the present methods give at times very good results, and that the degree of success varies with the weather situation, characterized, e.g., by the average interdiurnal pressure change over the test area. Because of this variation it would be desirable that every test of a numerical method includes a comparison with results obtained at some forecasting center or, at least, with the result of pure extrapolation. (*Same item as* 4.6–61, June 1953, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Prognostic charts.**—*Author's abstract.*

11G–79 551.509.312:551.515.1

Meeker, Ralph I., Jr. (*Amer. Airlines*), **A simple kinematic method for forecasting the motion of high level cyclones.** Jan. 20, **1952.** 27 p. 9 figs., 2 tables, 6 refs., 19 eqs. Mimeo. **DWB**—The paper aims at anticipating the motion of high level cold lows by analyzing velocity distribution due to pairs of oppositely rotating circular vortices, with a jet between them. The jet forecast method is based on selecting and combining these jets between vortex pairs to give the displacement (*Same item as* 4.4–66, April 1953, *Met. Abstracts.*) *Subject Heading:* **1. Forecasting cold lows.**—*C.E.P.B.*

11G–80 551.509.5

Morgan, David A., **The relationship between weather reconnaissance reports and the next day's weather over Korea.** *U. S. Air Force. 2143D Air Weather Wing, Technical Bulletin*, No. 8:23–27, Jan. **1952.** fig., tables. **DWB**—Objective empirical rules were formulated for forecasting good, bad or indifferent flying weather over north Korea from single weather reconnaissance reports (based on daily reports for first seven months of 1951). Factors found to be most significant were (1) meridional wind component and (2) temperature-dew point spread. These were plotted as abscissa and ordinate and the envelopes drawn for separating the 3 types of flying weather. Verification is given and compared with actual observational forecasts issued at Tokyo. *Subject*

Headings: **1. Objective forecasting 2. Flying weather forecasts 3. Forecast verification 4. Weather reconnaissance 5. Korea.**—*M.R.*

11G–81 551.509.56:632.187

Lertel, Albert G., **Objective method of forecasting thunderstorms in the Fire Weather District of northern California during July and August.** May, **1952.** 20+3 p. 4 tables, 4 figs., 6 charts (fold.). **DWB**—Four years of 500 mb charts and thunderstorm data (1948–51) were used to prepare the scatter diagrams and one year (1947) as an independent test. The parameters selected (from a dozen or more) as giving the best correlation were 500 mb height differences between Las Vegas and Brownsville and between Las Vegas and 50°N, 145°W (in the N.E. Pacific) and 500 mb temperature at Santa Maria and Oakland, sources of air, cold lows, moisture content (no correlation) and many other factors were studied, and the charts and scattergrams presented. Skill scores for July and August are given in detail, and appear encouraging especially for August. Verification figures of 1952 season are appended, showing high skill score for objective method and even higher for actual forecasts combining objective method and experience. (*Same item as* 5.1–89, Jan. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Thunderstorm forecasting 2. Objective forecasting 3. Fire weather forecasting 4. Northern California.**—*M.R.*

11G–82 551.509.54:551.558.2

Riehl, Herbert (*Univ. of Chicago*); Norquest, Kenneth S. and Sugg, A. L. (*all, U. S. Weather Bur., Chicago*), **A quantitative method for the prediction of rainfall patterns.** *Journal of Meteorology*, 9(5):291–298, Oct. **1952.** 4 figs., 11 refs., 7 eqs. **DWB**—An equation is developed relating vertical velocity W_h at height of nondivergence, to density, vorticity and changes of wind vector with height. Where relative vorticity decreases downstream, W_h is positive and it is assumed that precipitation will fall. The method was tested using 300 mb charts on 16 days in Oct.–Dec. 1951 with good results. Then prognostic 24-hour precipitation charts were prepared for 14 days using upper wind prognoses; and verified well. (*Same item as* 4.5–76, May 1953, *Met. Abstracts.*) *Subject Heading:* **1. Rainfall forecasting.**—*C.E.P.B.*

11G–83 551.509.3:551.509.5(73/9)

Thompson, J. C. (*U. S. Weather Bureau, Wash., D. C.*), **Applied research in weather forecasting.** *American Meteorological Society, Bulletin*, 33(5):195–198, May **1952. DWB**—The objectives of forecasting research are: 1) the systematization of forecasting procedures, 2) developing better methods for presenting forecasts and thereby measuring their usefulness, and 3) raising the accuracy of prediction. The author discusses various methods for attaining these aims. (*Same item as* 4.3–75, March 1953, *Met. Abstracts.*) *Subject Headings:* **1. Forecasting techniques 2. Forecast verification 3. United States.**—*I.L.D.*

11G–84 551.509.33

Treloar, H. M., **Seasonal forecasting in Australia—correlation method and general problems.** *Australian Institute of Agricultural Science, Melbourne, Journal*, 18(1):13–18, March **1952.** fig. **DLC**—The correlation method of long range forecasting is discussed in general terms. This method has been practiced for the last thirty years in forecasts covering period of several months issued by the Met. Dept. of India. The applicability of the method to conditions in Australia is being studied by a seasonal forecasting unit in the Dept. of Met., University of Melbourne, Australia. The present paper reports some of the conclusions reached by this unit regarding the expected accuracy of long range forecasts in Australia and the usefulness of such forecasts. (*Same item as* 4D–268, April 1953, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Seasonal forecasting 3. Forecast accuracy 4. Australia.**—*G.T.*

11G–85 551.509(02):37

U. S. Navy. Fleet Weather Central, **Some recent developments in synoptic meteorology.** Aug. **1952.** 13 sections, separately paged. refs., illus. **DWB**—A manual compiled from various sources to use for reference and instruction in training Naval Reserve Aerologists at Norfolk, Va. The contents include excerpts from papers by H. Riehl on forecasting in mid-latitudes; by J. J. George on forecasting cyclone movement in the Eastern U. S. A.; by Wolff and Haggard on use of the pastogram in pressure-height computation; by Duthie and Haltiner on estimating height of constant pressure surfaces; by Wobus on CAVT tables (constant absolute vorticity trajectories) used in map analysis; by Wolff on blocking patterns at 500 mb level; by Haltiner on verification by use of skill score; and by Harding on rules for typhoon forecasting. Other aids in analysis and forecasting are included. (*Same item as* 5.1-78, Jan. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Training manuals 2. Forecast aids. I. U. S. Bureau of Aeronautics. Project AROWA.**—*M.R.*

1953

11G–86 551.509.5

Bessemoulin, J., **Quelques aspects du contrôle des prévisions météorologiques et de la nécessité de leur adaptation aux usagers.** [Some aspects of the verification of meteorological forecasts and the necessity of their adaptation for the user.] *La Météorologie*, 4th Ser., No. 32:219–244, Oct./Dec. 1953. 2 figs., table, eqs. French, English and Spanish summaries p. 219. **DWB**—A thorough review of the principles of verification of skill in forecasting from the objective point of view and from the point of view of the public. The economic value of the special forecast may not have any relation to the impression of the person who receives the forecast by radio or telephone. The forecaster may be influenced psychologically by consideration of the number of "malcontents" or of satisfied users, since the population is more concentrated in the plains than in the mountains and some phenomena are more violent but so liable to failure at any given spot that it is "safer" to forecast no occurrence than occurrence; also persistence, mean or climatological forecasting "pays off" in terms of number of "malcontents." The statistical aspects of verification are treated at length. (*Same item as* 6.3–79, March 1955, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Forecasting skill 3. Applied meteorology.**—*M.R.*

11G–87 551.509.8

Bonasera, Francesco (*Urbino Univ. Geophys. Obs.*), **Controllo statistico di due proverbi sulla pioggia in uso in Urbino.** [Statistical verification of two weather maxims on rainfall in current usage in Urbino.] *Urbino. Università degli Studi. Osservatorio Geofisico*, [*Publication*], *Ser. B*, No. 17, **1953.** 10 p. **DWB**—The correctness of two popular weather maxims (calling for 40 and 47 consecutive days of rain if it rains on April 4 or December 2, respectively) is investigated computing the average rainfall for both cases if there was or was no rainfall on the critical day. It is found that although the maxims cannot be confirmed as being applicable to every single case, they seem to be correct for long period averages (1907–46). *Subject Headings:* **1. Weather lore 2. Statistical studies.**—*G.T.*

11G–88 551.509.313:681.14:621.38

Bushby, F. H. and Hinds, Mavis K., **The electronic computation of two series of 500 mb., 1000 mb., and 500–1000 mb, thickness forecast charts by application of the Sawyer-Bushby 2 parameter baroclinic model.** *Great Britain. Meteorological Research Committee, M.R. Paper*, No. 841, Dec. 31, **1953.** 8 p. 10 figs., 2 tables, 7 refs., 7 eqs. Mimeo. Also: **A preliminary report on ten computed sets of forecasts based on the Sawyer and Bushby two-parameter atmospheric model.** *Ibid.*, No. 863, May 26, **1954.** 7 p. 10 figs., table, 2 refs., 3 eqs. Mimeo. **GB-MO**—The Sawyer-Bushby model of the atmosphere is set out in a form suitable for machine computation of the height and thickness of pressure levels. The technique of computation is described and the results of two trials are shown in numerous charts. They gave a fair representation of the motion of the real atmosphere for a 24 hr period. In the second paper ten 12-hr and 24-hr forecasts of 500 and 1000 mb contours and 1000–500 mb thickness over N. Atlantic and W. Europe were computed on the Sawyer-Bushby model using 1 hr steps. Machine time was $8\frac{1}{2}$ min/step. Actual and forecast charts are shown and each case is discussed and compared with conventional forecasts. Correlation coefficients between actual and forecast 24-hr changes are tabulated. Correlation is good; on the whole the conventional forecasts showed up better but this was mainly due to neglect of heating of cold air over Atlantic in winter, overestimation of contour heights in anticyclones, and small area of grid. (*Same item as* 5.11–49, Nov. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Electronic computers.**—*C.E.P.B.*

11G–89 551.509.5

Crossley, A. F., **Measures of success in forecasting.** *Meteorological Magazine*, London, 83(981): 66–73, March **1954.** Also issued as: *Great Britain. Meteorological Research Committee, M.R. Paper*, 788, March 24, **1953.** 12 p. 13 tables, 7 refs., 12 eqs. Mimeo. **DWB**—The paper deals first with forecasts of one of two alternative events ("black or white"), both with some persistence. If c, c' are forecast accuracies of these events, $I=\frac{1}{2}(c+c')$ and I_0 is value of I obtained by forecasting persistence, criterion of success is $(I-I_0)/(1-I_0)$. Examples of meteorological forecasts are assessed on this basis. C. H. B. PRIESTLEY'S index (1945) of success in forecasting continuously varying elements is also applied to forecasts of upper winds and equivalent head winds. (*Same item as* 5.5–64, May 1954, *Met. Abstracts.*) *Subject Heading:* **1. Forecast verification.**—*C.E.P.B.*

11G–90 551.509.5

Faust, Heinrich, **Untersuchungen über Vorhersagekarte und Vorhersage.** [Investigations on prognostic charts and forecasts.] *Meteorologische Rundschau*, 6(5/6):82–85, May/June, **1953.** 2 figs. **DWB**—Daily prebaratics and forecasts at Bad Kissingen, 1951–1952, were checked for each general weather type and frequencies of different causes of error tabulated. Most frequent errors

were in estimation of lability and motion of fronts. (*Same item as* 5.5–65, May 1954, *Met. Abstracts.*) *Subject Heading:* **1. Forecast verification.**—*C.E.P.B.*

11G–91 551.509.57:551.515.3

Fawbush, Ernest J. and Miller, Robert C., **The tornado situation of March 17, 1951.** *American Meteorological Society, Bulletin,* 34(4):139–145, April **1953.** 11 figs., 4 refs. **DWB**—Conditions which the author considers important (if not necessary) for tornado development are enumerated. These are: 1) deep layer of dry air (<50% R.H.) aloft; 2) a low layer of moist air with a high mixing ratio compared to the dry layer above; 3) a wind maximum between 10 and 20 thousand feet (>35 knots) and making a large angle with the axis or edge of the moist tongue (most severe storms occur 50 to 150 mi S of this core); 4) a low level of free convection, and 5) a strong impulse such as a cold front or prefrontal line squall to initiate the storm. The conditions which prevailed early March 17, 1951 in Texas-Oklahoma and Lower Mississippi Valley, in all of the above respects, are described and illustrated by charts and diagrams, and verification shown on chart. (*Same item as* 5.5–67, May 1954, *Met. Abstracts.*) *Subject Headings:* **1. Tornado forecasting 2. Tornado formation 3. Synoptic conditions for tornadoes 4. Arkansas.**—*M.R.*

11G–92 551.509.5:551.579.4:519.241.1

Ford, Perry M., **Multiple correlation in forecasting seasonal runoff.** *U. S. Bureau of Reclamation, Engineering Monographs,* No. 2, (rev.), June **1953.** 38 p. 5 figs., 13 tables, foot-ref., 23 eqs. **DWB** (M79.6 F711m)—Emphasis in this monograph is on the application of multiple regression techniques to forecasting seasonal runoff, using several independent variables (Oct.–Jan. precip., April 1 snow water content, April–July precip.) and one dependent variable (April–July natural runoff). Runoff-season precip. is not known in advance but can be used in developing the regression curve. An additional independent variable may be added if absolutely necessary, but it is shown how better results may be had, if records are short, if fewer independent variables are used. The method is demonstrated for single tributary basins in Idaho, Colorado, Montana, etc. Every angle of computation and testing is considered. Finally, forecasts for large basins are treated briefly (*Same item as* 9.3–161, March 1958, *Met. Abstracts.*) *Subject Headings:* **1. Multiple correlation forecasting 2. Seasonal runoff forecasting 3. Hydrologic forecasting**—*M.R.*

11G–93 551.509.56:551.515.4

Forst, Albert L. (*Short Range Fore. Dev. Sec., U. S. Weather Bureau*), **Remarks on L. L. Means: On thunderstorm forecasting in the Central United States.** *Monthly Weather Review,* 81(2):40–42, Feb. **1953.** fig., table. **DWB**—A test of the thunderstorm forecasting technique devised by MEANS (*see* 4.9–52, Sept. 1954, *Met. Abstracts*) has been conducted, using 920 forecasts for 10 stations in the Mississippi Valley. The results are tabulated in 4 groups, yielding verifications ranging from 51% (Omaha) to 78% (Dayton) as compared to 60% for Omaha and 78% for Dayton when using Showalter's Stability Index. A chart of stability vs. moisture for Chicago for the same season (reproduced as Fig. 1) allows a no-thunderstorm forecast to be made for a group of cases lying on the high side of the 40% line of MEANS' method, yet having only 18% incidence of thunderstorms. (*Same item as* 5.11–54, Nov. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Thunderstorm forecasting 2. Objective forecasting 3. Stability-moisture index. I. Means, Lynn L. II. Showalter, A.**—*M.R.*

11G–94 551.509.52:551.557:629.13

*International Civil Aviation Organization, **Report on North Atlantic trial of an augmented programme of upper air observations carried out from March 9 to April 2, 1952 as a result of action by the ICAO Council on recommendation No. 7 of the third session of the Met Division.** *International Civil Aviation Organization, ICAO Circular,* 35-AN/30, **1953.** 92 p. 31+2 tables, numerous figs. (some fold.). **DWB**—In order to determine whether or not transocean upper wind forecasts could be improved materially if 4 rather than 2 rawin or rawinsonde observations a day were made at 34 ocean weather ships and coastal (land) stations in the N. Atlantic area, ICAO made a series of recommendations which led to the trial during March and April 1952 of 2 additional observations a day during alternate weeks. Results of analysis are given in detail with statistical tests of control against test periods and control against test for forecast centers. Results indicate some slight improvement in "D" value and wind forecasts during tests over control periods, but period was too short to be conclusive. *Subject Headings:* **1. Transatlantic wind forecasts 2. Pressure pattern flying 3. Upper air wind observations 4. Upper air wind forecast accuracy 5. North Atlantic air routes.**—*M.R.*

11G–95 551.509.313:551.509.327

Jensen, K. Morch and Wiin-Nielsen, Aksel (*Danish Met. Inst.*), **Motion of surface pressure centers in relation to upper mean maps.** *Geophysica,* Helsinki, 4(3):100–104, **1953.** eqs. **DWB**—Two current methods of forecasting the 24-hr displacement of surface pressure centers are tested for

accuracy in practical forecasting and to measure the error with a view towards improving the rules. The first method is the 50% rule on 500 mb charts. The second is the FJØRTOFT (1952) method of using a 500 mb space-mean-map. Methods are set forth, and results of tests on 75 large cyclones with closed circulation, 25 small cyclones without closed circulation (frontal waves and polar lows) are analyzed. The average displacement in 24 hrs of all cyclones was 1130 km and the error 0.25 for the second method, and 1340 km and 0.22 for the 50% rule. Thus centers move faster than 50% of the actual 500 mb motion, and for the FJØRTOFT method the centers moved with 75% of the space-mean-field. It was found that cyclones arrived at the forecast point in 27.6±6.0 hours instead of 24 hrs, but that even correcting the forecasts by the correct amount, errors were still large due to "derailment." After correcting for derailment (usually the cyclones moved to the left of the streamlines) an error of 0.18 was found in small cyclones and 0.21 for large ones. (*Same item as* 8.1–163, Jan. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Cyclone movement forecasting 2. Prognostic surface charts. I. Fjørtoft, R.**—*M.R.*

11G–96 551.509.58:632.9:633.491

Large, E. C., **Potato blight forecasting investigation in England and Wales, 1950–52.** *Plant Pathology*, Harpenden, 2(1):1–15, March **1953.** 7 figs., 8 refs. **DA**—Account of the application of the "Beaumont temperature-humidity rule" (temperature not less than 50°F and R. H. not below 75% for at least 48 hours) in England and Wales. Progress of blight in 1950, 1951 and 1952 is charted and validity of synoptic weather stations as forecasting centers analyzed. It is found that an "operations chart" method taking account both of meteorological warnings and first outbreaks is very reliable especially in July and August. Bearing of cumulative rainfall on outbreaks is not yet clear. (*Same item as* 5.5–69, May 1954, *Met. Abstracts.*) *Subject Headings:* **1. Potato blight forecasting 2. Wales 3. England.**—*C.E.P.B.*

11G–97 551.509.33

Leight, Walter G. (*U. S. W. B., Wash., D. C.*), **The use of probability statements in extended forecasting.** *Monthly Weather Review*, 81(11):349–356, Nov. **1953.** 8 figs., 2 tables, 17 refs. **DWB**—The need for qualification of weather forecasts has long been recognized. The diverse uses of predictions and variations in the forecaster's ability to prognosticate weather events correctly have suggested to previous writers that expressions of confidence or other means of weighing can serve the public to advantage. A particular method of expressing and scoring 5-day temperature forecasts in terms of probability statements has been tried experimentally by the U. S. Weather Bureau's Extended Forecast Section and found to provide valuable information in addition to that normally furnished. Furthermore, it is demonstrated that the participants in the experiment possess definite skill in selecting probability statements, and that relative verification results are comparable to those obtained by scoring the conventional forecasts. (*Same item as* 5.9–81, Sept. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Extended forecasting 2. Probabilities.**—*Author's abstract.*

11G–98 551.509.58:551.510.535

Minnis, C. M., **Ionospheric storm-warning services: assessment of their value.** *Wireless Engineer*, 30(5):103–108, May **1953.** fig., 9 tables, 7 eqs. **DLC**—A statistical method is described for checking accuracy of forecasts of "stormy" conditions on radio circuits which depend on ionospheric propagation. The economic value of such forecasts, and procedure when no forecast is available, are discussed. (*Same item as* 5.9 87, Sept. 1954, *Met. Abstracts.*) *Subject Heading:* **1. Ionospheric storm forecasting.**—*C.E.P.B.*

11G–99 551.509.5

*†Moyer, Vance E.; Van der Hoven, Isaac and Jones, David L., **Investigation of the optimum analytical techniques for weather analysis and forecasting.** Pennsylvania. State College. Mineral Industries Experiment Station. Div. of Meteorology, Contract N189s-86996, Final Report, June 30, **1953.** 182 p. 48 figs., 22 tables, 31 refs. **DWB**—Detailed test of forecast efficiency for one winter and one summer weather situation with a total of 20 maps, systematically withholding from the different analysts certain combinations of sea level or 500 mb data. The simultaneous presentation of pressure and winds did improve forecasts significantly. Pressure was easiest to forecast, sky conditions most difficult. The reduction of information affected the forecasts of low clouds and pressure, while wind speeds were least sensitive. Forecasts generally surpassed those of persistence or trend over land, but over the ocean areas pure persistence forecasts were better. The largest forecast errors occurred in the Newfoundland region. A small sacrifice in forecast quality leads to a considerable saving in time if an optimum scheme, described in detail, is adopted. The numerical test results are presented in numerous tables and the verification procedure is analyzed. The bibliography contains mainly items on the verification of forecasts. (*Same item as* 5.5–68, May 1954, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Synoptic analysis 3. Efficiency tests 4. United States. III. Neuberger, H.**—*A.A.*

11G–100 551.509.57:551.515.23

Riehl, Herbert and Haggard, William H., **Prediction of tropical cyclone tracks.** U. S. Bureau of Aeronautics (Navy), Project AROWA (TED-UNL-MA-501.12), Research Report, Dec. **1953.** 32 p. 12 figs., tables, 7 refs. **DWB**—The prediction of tropical cyclone tracks is investigated in terms of flow patterns at the 500 mb level. Techniques for predicting the zonal meridional components of motion 24 hrs in advance are developed. The zonal component of motion is computed from the geostrophic relation applied to 500 mb height differences on a grid moving with the cyclone center. The meridional component is computed on another portion of this same moving grid. The application of the techniques is demonstrated; results of application to the 1953 Atlantic storm season, and examples of the prediction techniques are included. (*Same item as* 5.11–55, Nov. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Tropical cyclone track forecasting 2. Zonal component of motion.**—*Author's abstract.*

11G–101 551.509.56/7:551.515.3/4

Showalter, A. K. (*WBAN Analysis Center, Wash., D. C.*), **A stability index for thunderstorm forecasting.** *American Meteorological Society, Bulletin,* 34(6):250–252, June **1953.** 2 figs., 3 refs. **DWB**—The history of the Showalter Stability Index, its calculation and usefulness in forecasting thunderstorms is outlined, and it is compared with the Gardner-Scherhag Instability Index (which is calculated in the same way only with reversal of sign + or −). In both cases, the parcel of air lifted adiabatically from 850 mb to saturation and then pseudo-adiabatically from there to 500 mb and the difference between the lifted temperature and the observed used as the index. In the Showalter Index a value of +6°C would be very stable and one of −6° or −8° would indicate probability of a violent storm or tornado. A new Index—the Showalter Tornado Index is described and its use with the Stability Index illustrated. It consists of θ at top of moist layer, $-\theta$ at wet bulb zero level, in whole degrees (°A). Check on spring 1952 cases shows probability of tornadoes if 0° or Tornado Index coincides with area of 0° or Stability Index. (*Same item as* 6.7–148, July 1955, *Met. Abstracts.*) *Subject Headings:* **1. Showalter's Stability Index 2. Showalter's Tornado Index 3. Gardner-Scherhag Instability Index 4. Tornado forecasting 5. Thunderstorm forecasting.**—*M.R.*

11G–102 551.524.37:551.509.532

U. S. Weather Bureau. Fruit-Frost Service, **Sixteenth annual report of minimum temperature forecasts and fruit-frost survey in Tulare County, California, 1953 spring season. 1953.** 28 p. 8 tables, map (fold. in back). **DWB**—A routine report for an unusually cold season with greatest number of "cold nights" (25 at 32.0°F) in this area of central California. Phenological data, itemized forecast distribution data, location and exposure of each of 28 temperature stations, forecast data for Lindsay key station for all nights of the season, verification of forecasts for each section of area for cold nights, detailed minimum temperature data for key station and averages and extremes for all stations, duration of temperature below specified values for all stations on "cold nights," and daily observations for Lindsay. A detailed map of the county showing stations is attached. (*Same item as* 5.3–193, March 1954, *Met. Abstracts.*) *Subject Headings:* **1. Fruit-Frost Service 2. Forecast verification 3. Minimum temperature forecasting 4. Tulare County, Calif. I. Crossan, Thomas R.**—*M.R.*

1954

11G–103 551.509.311

Chicago. Univ. Dept. of Meteorology, **Report on an experiment with forecasting of cyclone development.** Contract AF 19(604)-390, Technical Report, No. 4, **1954.** 21 p. figs., charts, refs. Contents: Pt. 1, Petterssen, Sverre, **The experiment,** p. 2–16. Pt. 2, Dunn, Gordon E. and Means, L. L., **The verification,** p. 16–21. **DWB**—An experiment, aiming at forecasting the formation and intensification of extratropical cyclones, was conducted by the Weather Forecasting Research Center in collaboration with the U. S. Weather Bureau District Center, Chicago, from 4 Jan. to 20 March 1954. The working hypothesis to be tested was formulated as follows: Cyclonic development at sea level occurs when and where an area of positive vorticity advection in the upper troposphere becomes superimposed upon a frontal zone at sea level. The experiment which was conducted in connection with the routine operation of the District Center, resulted in 97 verifiable forecasts. The verification indicated that the working hypothesis is useful. (*Same item as* 6.6–104, June 1955, *Met. Abstracts.*) *Subject Headings:* **1. Extratropical cyclone forecasting 2. Cyclone formation 3. Forecast verification.**—*Author's abstract.*

11G–104 551.509.54.2

Eldridge, Arthur C. (*U. S. Air Force Hdqts., Alaska*), **A numerical method of forecasting summer precipitation in the area of Elmendorf Air Force Base.** *Alaskan Science Conference, 3rd, Mt. McKinley National Park, Sept. 22–27, Proceedings,* pub. Sept. **1954.** p. 117–119. **DWB**—Method tested in summers of 1951, using data for 1949 and 1950 and later extended to 1952. Horizontal

convergence at 700 mb level associated with precipitation near Anchorage was used as one parameter. Sea level pressure difference between Elmendorf and Cordova against pressure difference between Kodiak and Naknek was another. Another table gives verification for the system as compared with each of two forecasters and persistence, respectively. The objective-method gave 77% correct and the other 3–73–75% correct. Quantitative precipitation forecasts were not satisfactory. *Subject Headings:* **1. Objective precipitation forecasting 2. Elmendorf A. F. Base, Alaska.**—*M.R.*

11G–105 551.509.5:629.13

George, Joseph J. et al., **To develop empirical objective methods of forecasting surface synoptic features for periods up to 48 hours through use of upper air and surface parameters.** Eastern Air Lines, Inc., Atlanta, Georgia, Contract AF 19(122)-468, Short Range Forecasting Project, Final Report (1954). 8 p. refs.—The results of the project to develop improved methods for forecasting meteorological parameters for operational use are summarized. A method for predicting cyclogenesis 12–24 hours in advance of its formation was formulated; this method is based upon "an injection of cold air at 850 mb." The prediction of the track, speed and future intensity for a 30-hour period for arbitrarily established categories of cyclones was accomplished. A method for predicting the future 30-hour position of polar anticyclones was developed. A system for predicting the average movement of various points of a cold front 30 hours in advance was introduced. Rules for warm frontogenesis were formulated and the prediction of warm frontal movement 12 hours in advance was accomplished. The forecasting of squall line formation was developed. The applicability and the accuracy of these methods is discussed. (*Same item as* 6.7–146, July 1955, *Met. Abstracts.*) *Subject Headings:* **1. Objective forecasting 2. Short range forecasting 3. Cyclogenesis 4. Aeronautical meteorology.**—*I.L.D.*

11G–106 551.509.5

Jones, David L. and Moyer, Vance E., **Analysis of simultaneous errors in prediction of various pairs of forecast parameters.** Pennsylvania. State Univ. Mineral Industries Experiment Station. Dept. of Meteorology, Contract N189s-92545, Final report, June 30, 1954. 71 p. 7 figs., tables, 5 refs. Also: **Progress Report No. 1,** Sept. 30, 1953. 12 p. 2 figs., 2 tables. **Progress Report No. 2,** Dec. 31, 1953. 19 p. 3 figs., table. **DWB**—In the Final Report results of 15,680 individual forecasts made by 7 meteorologists (one highly experienced, 4 moderately and 2 slightly experienced) for usual summer and winter weather situations were analyzed to see how forecast errors for one parameter influence (or are correlated with) forecast errors in another parameter, and to what extent the same forecaster repeats the same type of error. In all, 28 parameter pairs were tested—all permutations and combinations of cloudiness, ceiling, wind direction, wind speed, temperature, present weather, pressure and visibility. Contingency tables for each of the 28 parameter pairs for summer and winter show error frequencies and weather change frequencies, (in percentage showing probability of error in another), and forecast aid tables, plus chi-square and linear correlation coefficients for each pair Correlation at or above 2% significant level for errors and weather changes for some parameter pairs were plotted against each other. Errors in some pairs were definitely related, many were not. Tables of simultaneous changes would help improve forecasts. Also some changes should never be associated with each other. In winter, there is a higher percentage of association than in summer cloudiness and ceiling, ceiling and visibility; and wind speed and weather are most frequently correlated above 2% level. Most significant associations are logical. *Subject Headings:* **1. Forecast errors 2. Correlation of weather parameters.**—*M.R.*

11G–107 551.509.33:551.553.21(54)

†Ramdas, L. A.; Jagannathan, P. and Gopal Rao, S. (*all, Met. Office, Poona*), **Prediction of the date of establishment of southwest monsoon along the West Coast of India.** *Indian Journal of Meteorology and Geophysics,* Delhi, 5(4):305–314, Oct. 1954. 4 figs., 6 tables, 23 refs. **DLC**—Dates of establishment of southwest monsoon are tabulated for 1891–1950 for 4 sections of the West Coast of India, and the data analyzed statistically and shown graphically. The variability in time of onset averages about a month between extreme cases, and the standard deviation is about a week. Correlation coefficients worked out for 1899–1950 with Seychelles rain (April), Agro winds (first half of May), Darwin pressure (April), S. Rhodesia rain (Oct.–April) and (April), Java rain (Oct.–Feb.), etc. Combinations of these are used to establish a formula and results of calculations from formula are shown graphically for each year (1891–1950) in comparison with actual observation. Only about 7 cases out of 60 were over a week off one way or another. Forecasts for 1951–54 are given and verification discussed. (*Same item as* 7.5–98, May 1956, *Met. Abstracts.*) *Subject Headings:* **1. Monsoon forecasting 2. Southwest monsoon onset 3. India.**—*M.R.*

11G–108 551.509.58:632.187:551.577

Schroeder, Mark J. (*U. S. W. B., Distr. Forecast Center, Chicago*), **Verification of "probability" fire-weather forecasts.** *Monthly Weather Review,* 82(9):257–260, Sept. 1954. 6 tables, 6 refs.

DWB—Probability terms, especially in relation to precipitation occurrence, were incorporated in fire-weather forecasts on a trial basis in the Chicago District during the 1952 fire-weather seasons. These forecasts were verified in an attempt to determine whether or not such subjective estimates of probability were feasible. Results show that forecasters have some skill in assessing the probability of the occurrence of precipitation, especially for the first 30 hrs. (*Same item as* 6.9-127, Sept. 1955, *Met. Abstracts.*) *Subject Headings:* **1. Fire weather forecasting 2. Precipitation probability 3. Forecast verification 4. Chicago, Ill.**—*Author's abstract.*

11G–109 551.509.33:551.583.13

Takahashi, K. et al, **On the seasonal weather forecasting based on the periodicities.** *Journal of Meteorological Research*, Tokyo, 6(6):147–164, July **1954.** 4 figs., 9 tables, 15 refs., 16 eqs. In Japanese; English summary p. 147. **DWB, DLC**—Experimental seasonal weather forecasts based on the periodicities in weather changes were made since the fall of 1950 and the results were verified. We found that about 70% of the forecasts of 5-day mean temperature anomalies for the future 2½ months came true, while only about 55% of those of surface pressure were right. However, the forecast of the weather sequences based on the prognostic chart drawn by the calculated surface pressures gave good results. Next, hunting for periods of several elements was done for 5-day mean values of pressure, temperature and precipitation. And some fundamental problems in the extrapolation based on periodicities were discussed. (*Same item as* 7.1–172, Jan. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Seasonal forecasting 2. Periodicities.**—*Authors' abstract.*

11G–110 551.509.25:551.509.5

Teweles, Sidney, Jr. and Wobus, Hermann B. (*U. S. Weather Bur., Wash., D. C.*), **Verification of prognostic charts.** *American Meteorological Society, Bulletin*, 35(10):455–463, Dec. **1954.** 5 figs., 4 tables, ref., 3 eqs. **DWB**—The meteorological features of the 30-hour prognostic chart prepared by the Weather Bureau Air Force Navy Analysis Center (WBANAC) is described and the desirable characteristics of a system for scoring prognostic charts are set forth. The verification system used in the WBANAC is described. "The preliminary score is a function of the pressure difference between pairs of points selected within the main portion of the forecast area." "A secondary score, the deviation from a mean of daily scores adjusted by handicaps assigned to the individual forecasters, is a measure of forecasting skill independent of many spurious effects." A completed verification is presented. (*Same item as* 7.8–85, Aug. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Prognostic charts 2. Forecast verification.**—*I.L.D.*

11G–111 551.509.5

Titus, R. L.; Hornstein, R. A. and Munn, R. E., **Verification ratings of actual "weather" forecasts vs. a fixed "weather" forecast.** *Canada. Meteorological Div., Cir.* 2461, Tec. 183, April 9, **1954.** 6 p. **DWB**—Evidence is presented to show that a fixed forecast of "a few showers (or snowflurries)," or "widely scattered showers (or snowflurries)" will not provide as high a verification score as was obtained by the actual forecasts verified for Halifax and Moncton during the period Dec. 1, 1952, to Feb. 28, 1953. The question is raised as to how best to provide a public service in those synoptic situations in which he forecaster's prognostic confidence is not high. *Subject Heading:* **1. Forecast verification.**—*Authors' abstract.*

11G–112 551.509.5:551.509.58:551.579

U. S. Weather Bureau, **Verification of water supply forecasts.** Washington, D. C., Sept. **1954.** 4 p. 9 figs., 2 tables. **DWB** (M79.8 U587ve)—Requests pertaining to the relative accuracy of the Weather Bureau and Soil Conservation Service water supply forecasts and the need for continued verification and appraisal of the Bureau's service programs led to the analysis presented in this report. Two types of comparison are made: first, relative accuracy of forecasts published by the two agencies; and second, relative accuracy of Bureau forecasts issued on different dates throughout the season. The method used to compare the WB and SCS forecasts was to restrict the verification to the April 1st forecasts by the two agencies for the same forecast points and the same years. All WB-SCS comparisons have been made on the seasonal basis, although any conclusions to be reached are also applicable to forecasts of water-year flow volume. Data from five observation points during the period 1947–1953 is given in tables; the comparison of WB-SCS forecast accuracy for these areas is given in graphs. On the basis of data for all areas combined, it is concluded that there is very little difference in the overall accuracy of the forecasts by the two agencies. *Subject Headings:* **1. Forecast verification 2. Water supply forecasting.**—*From author's abstract.*

11G–113 551.509.25

Wasko, Peter E., **Verification of prognostic maps prepared by means of the control-line method.** *American Meteorological Society, Bulletin*, 35(6):257–260, June **1954.** 3 figs., 2 tables, 2 refs. **DWB**—The author verifies 24- and 48-hr 500 mb prognostic maps, prepared on a current basis by means

of the objective kinematic "control-line" method, with the aid of the respective actual maps. Th measures of forecast performance were: correlation, mean-error and flight-index. In comparison with the persistence method, the control-line method yielded consistently good 24-hr and reasonably good 48-hr forecasts. (*Same item as* 6.7–138, July 1955, *Met. Abstracts.*) *Subject Headings:* **1. Prognostic charts 2. Control-line method.**—*I.L.D.*

11G–114 551.509.312:551.509.31

Wilson, H. P., **Test of a grid method of forecasting the motions of lows at 500 millibars in Arcti regions.** *Canada. Meteorological Div., Cir-2539* TEC-194, Oct. 4, **1954.** 8 p. fig., 3 tables, 2 refs **DWB**—RIEHL's grid method for forecasting the 24-hr motions of hurricanes which is "essentially a method for measuring mean zonal and meridional geostrophic wind components over an area around the hurricane roughly around 1000 mi square" was modified into a square grid so that "the gradient measured are parallel to the great circles at right angles to each through the center of the low and no strictly zonal or meridional components." It was applied to the Arctic, where air masses are pre dominantly barotropic, and tested with 500 mb charts of the Historical Weather Map series for Jan. Sept. 1951. The method developed for the Arctic is described and the assumptions and errors are discussed. This grid method was found to give satisfactory forecasts about two-thirds of the time (*Same item as* 6.11 152, Nov. 1955, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Forecasting techniques 3. Forecasting cold lows. 4. Arctic weather forecasting.**—*I.L.D.*

1955

11G–115 551.509.5

Bagrov, N. A. and Morskoĭ, G. N., **Metod otsenki prognozov.** [Method of evaluating fore casts.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:24–28, July Aug. **1955.** fig., 5 tables, 4 refs. 13 eqs. **DWB**—The alternative method with a given tolerance of evaluating quantitatively the accuracy of a forecast is criticized. Instead, the author proposes a method of evaluation in which the value of the forecast would be a function of the forecast error. The formula developed for evaluating the forecast values is $F = e^{-1.55^2/\sigma^2}$ and its application is illustrated. (*Same item as* 7.9–115, Sept. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Forecast errors 2. Forecast verification.**— *I.L.D.*

11G–116 551.509.313

Bergthórsson, P., Döös, B. R.; Fryklund, S. et al., **Routine forecasting with the barotropic model.** *Tellus*, 7(2):272–274, May, **1955.** 3 figs., 3 tables, ref. **Comments** by W. H. Best, *Ibid.* 8(1):115–116, Feb. **1956.** table, **DLC**—Some results of the test forecasts conducted in Stockholm on the BESK computer are reported. The method of verification by an objective method involving evaluation of prognostic value by a board of six meteorologists is discussed and its results are tabulated. Cases of successful application of numerical prediction in daily forecasts are mentioned. BESK comments on the problem of forecast verification. (*Same item as* 8F–7, June 1957, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Forecast verification 3. Barotropic models. I. Haug, O. II. Lindquist, R.**—*G.T.*

11G–117 551.509.33

Bolotinskaia, M. Sh., **K voprosu ispol'zovaniia 20% amplitudy v kachestve kriteriia otsenki opravdyvaemosti dolgosrochnykh prognozov pogody.** [Utilization of 20% amplitude as a criterion for evaluating the reliability of long range weather forecasting.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:28–30, Jan./Feb. **1955.** table, 3 refs. **DWB**—For series of observations up to 25 years the 20% amplitude may differ considerably from the mean square deviation. With increasing number of observations new extreme years may appear so that the magnitude of the amplitude may change sharply; the reliability of forecasts changes then independently of the quality of the forecasts. This criterion is not always practical since it demands greater precision but permits forecasts with very large errors. (*Same item as* 7.5–95, May 1956, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Forecast accuracy.**—*I.L.D.*

11G–118 551.501.42:551.509.312

de Lisle, J. F., **Some computations of 500 mb height tendencies in the New Zealand region. New Zealand.** *Meteorological Service, Technical Note*, No. 120, March **1955.** 9 p. 9 figs., 4 tables 6 refs., 8 eqs. **DWB**—Five 500 mb barotropic tendency computations for the eastern Australia-New Zealand region done at 12-hourly intervals were found to give about the same accuracy as that found in similar Northern Hemisphere calculations. The inclusion of the baroclinic effect made little difference to the results. Some possible reasons for errors in the computations are discussed. (*Same item as* 7.7–77, July 1956, *Met. Abstracts.*) *Subject Headings:* **1. Barotropic tendency computation 2. Baroclinic effect 3. New Zealand 4. Australia.**—*Author's abstract.*

11G–119 551.509.3:519.24:551.509.53

Eyjen, Sig., **Statistik varsling av middelverdier.** [Statistical forecasting of mean values.] *Naturen*, 79(6):162–183, **1955.** 2 figs., 5 tables, 7 eqs. **DLC**—Some fundamental problems of statistical forecasting are demonstrated and discussed. BIRKELAND and FÖYN'S monthly and annual mean values of temperature at Stockholm and Edinburgh, 1776–1926, are classified into positive and negative deviations from the mean value to check the persistence which was subsequently tested by the law of probability. The negative results were re-tested by dividing the deviations into 4/10° which then gave a very smooth normal curve when based on the computed standard deviation σ expressed by $\sigma = \sqrt{\frac{\Sigma v^2}{N}}$ shown in a histogram. Correlation between deviation from monthly mean for the months Feb. and March 1776–1925 at Stockholm is presented graphically to demonstrate applications and limitations of three rules derived for temperature forecasting. Tabulated data of persistence and frequency (%) of uniform temperature deviations for monthly values (1776–1925) are given for Stockholm and Edinburgh. The standard deviation in °C computed for each month in the period 1901–1930 is tabulated for six Norwegian stations. It is concluded that investigation of meteorological elements other than temperature will contribute to improve determination of location and extent of the confidence region of statistical forecasting. (*Same item as* 7.3–124, March 1956, *Met. Abstracts.*) *Subject Headings:* **1. Statistical forecasting 2. Temperature forecasting 3. Stockholm, Sweden 4. Edinburgh, Scotland.**—*W.N.*

11G–120 551.509.59:63

Franken, Ernst, **Über den Landfunkwetterdienst und eine spezielle Beratung der Landwirtschaft durch die AMVB Hamburg.** [On rural radio weather service and a special advisory service for agriculture through the AMVB Hamburg.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):171–177, **1955. DWB**—This paper contains an account of the beginning of rural radio weather broadcasts in north Germany after the last war, the preparation of the weather forecast with special reference to its utility in various farming activities and the preparation of special forecasts for agriculture of which several examples are given in an appendix. An example of a model numerical forecast and of its verification is presented. (*Same item as* 8.5–109, May 1957, *Met. Abstracts.*) *Subject Headings:* **1. Agrometeorological forecasting 2. Numerical forecasting 3. Northern Germany.**—*I.L.D.*

11G–121 551.509.59:551.543

Gandin, L. S. and Sinel'nikova, K. K., **O prognoze skorosti peremeshcheniia baricheskikh tsentrov.** [Forecasting the velocity of movement of baric centers.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:27–30, May/June **1955.** table, 2 refs., eqs. **DWB**—The author develops a quantitative method for forecasting the movement of pressure centers based upon the transformation of known extrapolation formulas and the results of verification of the prepared method and of other methods on the basis of extensive material. The formulas developed are:

$$V_c = \frac{B^2}{P_c - P_1} \cdot \frac{\partial pt}{\partial y} \quad \text{and} \quad V_c = -\frac{B^2}{P_c - P_1} \cdot \frac{\partial pt}{\partial y}$$

The procedure for calculating the movement of pressure centers and that of verification are outlined and the forecasting is compared with the method of V. I. BUSHUK. (*Same item as* 7.9–117, Sept. 1956, *Met. Abstracts.*) *Subject Heading:* **1. Pressure tendency forecasting.**—*I.L.D.*

11G–122 551.509.5:016

†Gringorten, Irving I., **Methods of objective weather forecasting.** *Advances in Geophysics*, 2:57–92, **1955.** 3 tables, 6 figs., 124 refs. **DLC**—This is the first comprehensive coverage of the entire field of what is known in the United States and Canada as objective weather forecasting. It includes (in the final chapters) a detailed discussion of accuracy and present or future trends. (For an abstract covering all aspects of the paper *see* 6.10–12, Oct. 1955, *Met. Abstracts.*) *Subject Headings:* **1. Objective forecasting 2. Forecast verification 3. Bibliography on objective forecasting**—*M.R.*

11G–123 551.509.5

Gringorten, Irving I., **Test of significance in a verification program.** *Journal of Meteorology*, 12(2):179–185, April **1955.** 2 figs., 5 tables, 8 refs., 22 eqs. **DWB**—Scores for forecasts which give one event out of 2 or more mutually exclusive events (rain or no rain, different types of cloud) tend to a normal distribution. The test of skill is the degree to which the occurrence of the forecast event exceeds the climatic frequency. This may differ from the 95% confidence limit. (*Same item as* 6.8–114, Aug. 1955, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification 2. Forecasting skill.**—*C.E.P.B.*

11G–124 551.509.5

*Gringorten, Irving I.; Lund, Iver A. and Miller, Martin A., **A program to test skill in terminal forecasting.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 80, June **1955.** 63 p. 15 figs., 13 tables, 10 refs., 17 eqs. Appendices 1 and 2. Appendices 3–6 issued in separate publication, No. 80 (Annex), June **1955.** tables. **DWB, DLC**—The present study is aimed at setting up and testing a system for determining the skill of a forecaster (not the economic value, or the scientific accuracy of the forecast) in a manner which would make it impossible to hedge or to take advantage of persistence, climatology or favorable periods of weather. Ten years of climatic data for each of four stations were used and the tests made over a period of 2 years. Differences between stations, between individual forecasters at a station, effectiveness of forecast aids, relative difficulty in forecasting the different elements or in different times of day, seasons or individual years, and variations in skill with length of forecast interval were analyzed by means of this system. The stations used were Langley Air Force Base, Virginia (1936–52), Mitchell Field, Long Island (1937–53), Minneapolis (1939–52) and McChord Air Force Base, Washington (State) (1940–52). Detailed climatic and contemporary tables and the scoring procedures are presented for each element and each station in the appendix. The main report outlines in detail the procedures in preparing and conducting the program (choice of station, coding, data collection, day-to-day forecasting, verification and scoring) and results of the 4 trial programs, theory, etc. (*Same item as* 8.3–18, March 1957, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification programs 2. Forecasting skill 3. Climatic data for forecast verification.**—*M.R.*

11G–125 551.509.5

†*Holloway, J. Leith, Jr. and Woodbury, Max A., **Application of information theory and discriminant function analysis to weather forecasting and forecast verification.** Pennsylvania. Univ Institute for Cooperative Research, Contract Nonr 551(07), Technical Report, No. 1, Feb. **1955** 85 p. tables, 23 refs., eqs. **DWB**—An index of forecast skill, called the "information ratio" has been derived from information theory. This ratio is zero when the forecasts show no skill and is unity when the forecasts are perfect. The statistical distribution of this ratio is discussed. Various objective and synoptic weather forecasts are tested by the information ratio. Also, the information ratio is compared with the skill score, a commonly used index of forecast skill. Finally, the various discriminant functions derived for forecasting precipitation categories at New York City are discussed. *Subject Headings:* **1. Forecast verification 2. Forecasting skill 3. Forecasting skill calculations.**—*Authors' abstract.*

11G–126 551.509.5

Jorgensen, Donald L. (*U. S. W. B. Airport Sta., San Francisco*), **Note on the measurement of forecast skill using a moving class interval.** *Monthly Weather Review*, 83(1):11–13 Jan. **1955** table, 3 refs., 3 eqs. **DWB**—The use of a moving class interval in calculating a skill score for a series of forecasts is investigated. When forecasts are expressed in quantitatively exact terms, it is found that the use of this type of interval in calculating the correct and expected correct number of forecasts gives a good measure of the skill of the forecasting procedure. (*Same item as* 6.11–159 Nov. 1955, *Met. Abstracts.*) *Subject Heading:* **1. Forecasting skill calculations.**—*Author's abstract*

11G–127 551.509.5

Jorgensen, Donald L. (*WBAS, San Francisco, Calif.*), **A graphical solution of the conventional skill score involving two categories.** *Monthly Weather Review*, Wash., D. C., 83(7): 139–142, July **1955.** fig., 3 tables, numerous eqs. **DWB, DLC**—A chart for the graphical solution of the skill score is developed on the basis that the number of cases is held constant. A procedure is suggested by means of which the chart presented may be used for any number of cases. The overall range of the skill score is shown to be restricted by limiting values of the number of correct and expected correct forecasts. Other characteristic features of the score are pointed out. *Subject Headings:* **1. Forecast verification 2. Skill score calculation.**—*Author's abstract.*

11G–128 551.509.532:633.11

Lichikaki, V. M., **Metodika prognoza kriticheskoĭ temperatury ozimoĭ pshenitsy.** [Method of forecasting the critical temperature of winter wheat.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:38–40, Nov./Dec. **1955.** 3 figs., table, eqs. **DWB, DLC**—Experimental data on the relationship between the frost resistance of winter wheat varieties are presented and the dependence of frost resistance upon the sum of mean daily temperature of the atmosphere and of the soil at the depth of the branching node is expressed by means of graphs in which the sums of the daily means of temperature from the date on which resistance passes through 0°C to the date of the experimental determination of the critical temperature are represented on the abscissa and the critical temperature are represented on the ordinate. These relationships are expressed also by means of empirical formulas. On the basis of both graphs and formulas a table is constructed giving the scale of dependence

of the critical temperature of winter wheat upon temperature and soil temperature at the branching node. The reliability of these forecasting procedures examined by means of specific examples was found to be very high. (*Same item as* 8.8–88, July 1957, *Met. Abstracts.*) *Subject Headings:* **1. Frost resistant wheat 2. Frost forecasting formulas 3. Wheat.**—*I.L.D.*

11G–129 551.509.58:632.187

Lindquist, H. D. (*WBAS, Seattle, Wash.*), **Verification of the 1954 wind forecasts in the Washington Fire Weather District.** (In: U. S. Weather Bureau, [**Papers presented at the Fire Weather meeting, Portland, Ore., Feb. (March?), 1955**)] 7 p. map, table. Mimeo.) **DWB**—At the end of the 1954 fire season it was decided that wind forecasts for 33 stations in western, central and northern Washington State would be verified. The forecasts were made without any regard for verification and are thus unbiased in that respect. Wind direction and speed verification, according to the criteria set forth, range from 41% (Enumclaw) to 91% (Columbia Gorge) and 12% (Port Orchard) to 93% (Quilcene), respectively. Average winds, % of time wind 10 mph or over, variability in wind speed, and % of time forecasts gave too high speeds are tabulated for each station. It shows that tendency is to forecast too high speeds (or else anemometers are in poor locations with respect to terrain, etc.) A questionnaire to determine if forecasts were satisfactory showed that dissatisfaction existed in those few places were winds were most variable and hence forecasts considered of little use anyway. (*Same item as* 7.5–57, May 1956, *Met. Abstracts.*) *Subject Headings:* **1. Fire weather forecasts 2. Wind forecast verification 3. Washington State.**—*M.R.*

11G–130 551.509.312:551.547 551.511

Maine, R. and Pierrehumbert, C. (*both, Central Met. Bureau, Melbourne*), **Constant absolute vorticity trajectories.** *Australian Meteorological Magazine*, Melbourne, No. 8:37–47, March **1955.** 4 figs., 2 tables, 5 refs., 7 eqs. **DWB**—A graphical method of solution of the equation of conservation of absolute vorticity is produced and the result applied to the 500 mb constant pressure surface. A more readily applicable though approximate mathematical alternative solution is also obtained. Forecasts made from the results of the solution of the equation at a fixed point are subjected to a verification test. These results are examined for their degree of significance. The limited number of forecasts made are found to present good agreement with actual conditions when caution is exercised in the selection of an initial wind. (*Same item as* 7.11–141, Nov. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Constant absolute vorticity trajectories 2. Constant pressure surface forecasts.** – *Authors' abstract.*

11G–131 551.509.5:551.509.33

Munn, R. E., **Analysis of experimental outlooks issued by the Dominion Public Weather Office, Halifax, N. S., Nov. 25, 1952 to Nov. 24, 1953.** *Canada. Meteorological Div., CIR*-2644, TEC-213, April 18, **1955.** 15 p. 3 figs., 2 tables, 6 refs. **DWB**—No improvement was noted in verification of outlooks issued experimentally for Halifax during a one year period. Using confidence factors it was seen that sunshine forecasts would verify very satisfactorily, but precipitation would verify less than 50% of the time. *Subject Headings:* **1. Forecast verification 2. Confidence forecasts 3. Extended forecasting 4. Halifax, N. S.**—*M.R.*

11G–132 551.509.52:656.7(261)

O'Carroll, F. M., **Investigation into the accuracy of wind forecasts prepared at Shannon Airport for the Great-Circle Route, Shannon-Gander.** *Eire. Meteorological Service, Technical Note*, No. 20, Dec. **1955.** 23 p. 4 figs., 7 tables, 7 refs., eqs. **DWB**—The differences between forecast 700 mb and 500 mb wind components on the Great-Circle route from Shannon to Gander and the subsequently estimated actual values of these components have been recorded over a two-year period, and the distribution of these differences is tabulated. It is found that approximately 92% of all such forecasts were within 12 kn of the corresponding actuals and about 73% were within 7 kn. The differences in general are found to have an approximately symmetrical distribution about a mean value close to zero, but the distribution is shown to be different from a simple normal distribution. A compound normal distribution is fitted to the observed values and by this means diagrams are prepared showing the expected percentage of forecasts having a given degree of accuracy. The effect on the accuracy of the forecasts of a lack of recent actual upper air charts is also investigated. It is found that during the winter half of the year, forecasts prepared immediately after the analysis of new upper air charts are appreciably more accurate than those prepared at other times of the day. (*Same item as* 7.11–73, Nov. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Upper air wind forecast accuracy 2. Forecast verification 3. Shannon-Gander air route.**—*Author's abstract.*

11G–133 551.509.56:632.187(796)

Small, Robert T., **Evaluation of 700 millibar data in thunderstorm forecasting in the Boise Fire-Weather District.** (In: U. S. Weather Bureau, [**Papers presented at the Fire Weather meeting,**

Portland, Ore., Feb. (March?), 1955]. 5 p. 3 tables, 4 charts.) **DWB**—Objective tests made fo cases resulting in no thunderstorms, and in thunderstorms in the western, the eastern, and th combined east and west sections of the region (S. E. Oregon, S. Idaho and W. Wyoming), respectively During the 1953 and 1954 fire season (summer) thunderstorms occurred on 65% of the days in one o other or both (32% in both) sections. Tables of 700 mb temperature, dew point and T-TD differ ence between 10 pairs of stations in the west according to the several categories of thunderstorm activity, show that temperature and moisture at Boise, Medford and Oakland at 700 mb, show promise of giving good results. Many comments are made on relationships and their forecastin significance. (*Same item as* 8.5–116, May 1957, *Met. Abstracts.*) *Subject Headings:* **1. Fire weathe forecasting 2. Objective thunderstorm forecasts.**—*M.R.*

11G–134 551.509.5

Thompson, J. C. (*W. B. A. S., Los Angeles*) and Brier, G. W. (*U. S. W. B., Wash., D. C.*) **Economic utility of weather forecasts.** *Monthly Weather Review*, Wash., D. C., 83(11):249–254 Nov. **1955.** 2 figs., 3 tables, 8 refs., 12 eqs. **DWB, DLC**—Methods of analysis for measuring the economic utility of a weather forecast and verification procedures "based upon the operational risk involved in taking protective action against adverse weather" are presented. Equations are de veloped for an economic decision criterion and for providing a quantitative measure of the valu of any categorical weather prediction where the economic risks are specified; the calculation of the economic value of forecasts for any given value of economic risks by means of verification data fo a series of probability forecasts is illustrated. The determination of the order of magnitude of the economic gains resulting from categorically issued public forecasts and the relation between the formulas used to assess forecasting skill are discussed. (*Same item as* 8.11–105, Nov. 1957, *Met Abstracts.*) *Subject Headings:* **1. Economics of weather forecasts 2. Forecast verification.**—*I.L.D*

11G–135 551.509.5(02)

U. S. Air Weather Service, **Some techniques for deriving objective forecasting aids and methods** Its *AWS Manual*, 105-40 (rev.), April **1955.** 51 p. 17 figs., tables, 10 refs., eqs. **DWB**—A manua to guide Air Weather Service forecasters in preparation and use of objective forecast studies or aids to assist the experienced forecaster, as well as the man new to a region, in making subjective fore casts, and to develop objective methods which will give an actual forecast. Systematic procedures suggested by J. J. GEORGE are outlined, examples of purely yes or no objective techniques (ceiling and visibility, advection-radiation fog, precipitation and thunderstorm forecasting) and, finally objective techniques for forecasting "when" and "how much," are taken up in separate sections of the manual. Numerous statistical (scatter chart) examples and verifications of actual cases, check lists, graphical procedures, etc. are presented and discussed. (*Same item as* 7.11–23, Nov. 1956 *Met. Abstracts.*) *Subject Heading:* **1. Objective forecasting manuals.**—*M.R.*

11G–136 551.509.5

U. S. Weather Bureau, **Verification of practice forecasts.** Its *Practice Forecast Program, Bulletin*, No. 1, May **1955.** 6 p. 5 figs., 7 refs. **DWB.** Also: **Practice forecast results, Periods 5–9, 1955.** *Ibid.*, No. 2, Aug. **1955.** 10 p. table. **DWB**—The theory of forecast verification is briefly reviewed, starting from the idea that a forecast should be expressed in terms of the "most likely" value and the chances that it will be a little less or a little greater than this value; and con tinuing with the proposition that different verification systems would affect the advantage of picking either the mode, the median of the arithmetic mean value and the skewed distributions or even bimodal distribution which would be possible. The actual operations of the forecast and the veri fication system (by means of IBM cards) are set forth in detail in Pt. II. Card processing and checking procedures are quite complicated, but rational. About 2000 forecasts are verified each week Tables give average score of all 450 odd participants for the several elements are tabulated and compared with that of the official forecasts. *Subject Headings:* **1. Forecast verification 2. Punched card applications.**—*M.R.*

11G–137 551.509.5:551.547.1

*White, Robert M., **Preparation of extended forecasts of the pressure height distribution in the free atmosphere over North America by use of empirical influence functions.** *U. S. Air Force Cambridge Research Center, Air Force Surveys in Geophysics*, No. 68, May **1955.** 47 p. 4+14 figs., 19 tables (fold.)+4 tables, 6 refs., 9+17 eqs. **DLC**—This report explains the use of "empirical influence functions" in forecasting heights of pressure surfaces at the 1000, 500 or 200 mb levels for 24, 72 or 120 hrs in advance, without preparing analyzed synoptic charts as a preliminary step but directly from the teletype data for a network of 15 radiosonde stations in North America. The actual tables (appended) are based on relationships of pressure heights at 45 points to contour heights at a given point in the upper atmosphere, and are in the form of simple weighting or influence func tions based on statistical analysis of past data for the continent. Accuracy in practice (winter

1953–4) is comparable to current methods and is greater in east than west side of continent. The forecasts were more accurate for high than low elevations because surface disturbances are often shallow and local. Five-day forecasts were next to useless, but data are included nevertheless for 120 hrs. Theory, network, use of tables and an article to be published in *Journal of Meteorology* are included in report. This gives theory and results of 125 independent forecasts. (*Same item as* 8.10–25, Oct. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Pressure height forecasts 2. Empirical influence functions 3. Extended forecasting 4. Objective contour height forecasting 5. North America. I. Palson, William C.**—*M.R.*

1956

11G–138 551.509.53

Artamonov, A. A., **Sposob predvychisleniia temperatury vozdukha.** [A method of predicting air temperature.] *Meteorologiia i Gidrologiia*, No. 12:36–39, Dec. **1956.** 2 figs., 3 tables, 6 eqs. **DWB, DLC**—On the assumption that the annual variation of air temperature from month to month can be approximated by a periodic function with specific characteristics increasing in magnitude during the first half of the year, decreasing during the second half, and passing through zero in the middle of the year, the author develops a formula for precalculating air temperatures. This formula is

$$T_n = T_{n-1}(D^T{}_{n-1} + D^{T'}(N)'_{n-1})/2$$

The cartographic expression of expected variation of temperature from the normal for the period in the formula

$$D^T{}_{n-12} = T_{n-12} - T'(V)_{n-12}$$

is used. The use of these formulas and their validity is illustrated with the aid of temperature data for Moscow. (*Same item as* 8.10–115, Oct. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Temperature forecasting 2. Temperature calculations 3. Moscow, U.S.S.R.**—*I.L.D.*

11G–139 551.509.5:616:061

Aujeszky, László, **Az orvosmeteorológiai prognózisszolgálat bevezetésének szinoptikai kérdései.** [Synoptic problems connected with the establishment of a medical meteorological forecasting service.] *Időjárás*, Budapest, 60(6):365–375, Nov./Dec. **1956.** English summary p. 365. **DLC**—There is an increasing demand in Hungary for specialized forecasts for use by the medical profession. Surgeons try to avoid operations during weather changes because post-operative complications are more frequent at such times. Similar situations exist in other branches of medicine. The author discusses the meteorological aspects of a specialized medical forecasting service planned in Hungary. The elements to be forecast are frontal passages, air masses and duration of natural synoptic periods. The same elements serve as a basis to the regular 36-hour forecasts of the Hungarian weather service. These forecasts are being continuously verified by an independent agency and have been found to have an accuracy of 90%. The medical forecasts would be even more accurate if in cases of doubt a "chance of occurrence" forecast would be issued instead of the "most probable" forecast. The synoptic forecasts would be communicated daily to a group of medical experts who would issue the final forecast and also maintain a consultant service for special problems. Personnel requirements of such a cooperative project are discussed and a daily work schedule is proposed. (*Same item as* 9.1–115, Jan. 1958, *Met. Abstracts.*) *Subject Headings:* **1. Medical meteorological forecasting service 2. Hungary.**—*G.T.*

11G–140 551.515.13:551.509.317

Chicago Univ. Weather Forecasting Research Center, **An experiment in forecasting the displacement of 500-millibar troughs and ridges.** *Journal of Meteorology*, 13(5):421–432, Oct. **1956.** 11 figs., 6 tables, 19 refs. **DWB**—A team led by C. S. Newton computed 24 and 48 hr motion of 500 mb troughs and ridges, Jan. 24–March 14, 1955, by: 1. Linear extrapolation, 2. Climatological mean, 3. Extrapolation of acceleration in past 24 and 48 hours, 4. Grid methods of Riehl modified by H. P. Wilson, 5. Petterssen's wave formula, 6. Rossby's longwave formula, 7. Constant absolute vorticity trajectories, 8. Pressure-kinematic extrapolation by Petterssen's formula, 9. Fjørtoft's barotropic graphical technique. The relations between observed and computed movement and acceleration are shown by dot diagrams. Nos. 4, 5, 6 and 8 were significantly better than linear extrapolation (which is rarely justified), but in some cases they gave misleading results. (*Same item as* 8.2–135, Feb. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Upper level trough movement forecasting 2. Upper level ridge forecasting.**—*C.E.P.B.*

11G–141 551.509.312:551.515.1

Estoque, M. A., **A prediction model for cyclone development integrated by Fjørtoft's method.** *Journal of Meteorology*, Boston, 13(2):195–202, April **1956.** 11 figs., 2 tables, 4 refs., 19 eqs. **DWB.**

Also issued as: Chicago Univ. Dept. of Meteorology. Contract AF 19(604)-1293, Technical Repor No. 6, August 1955. 19 p. 3 figs., 2 tables, 4 refs., 19 eqs.—A set of prediction equations based o a $2\frac{1}{2}$ dimensional model is derived. These equations are integrated graphically for 10 cases of sea level cyclogenesis. The resulting forecasts for the 1000 mb surface indicate accuracies comparabl to those of numerical forecasts using the three-level model. The study was based on 10 cases fo the U. S., Nov.–April 1950–55. Initial forecast and verification charts are reproduced for cases and 2. (*Same item as* 7.9–108, Sept. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Cyclone development 3. Fjørtoft's graphical method.**—*Author's abstract.*

11G–142 551.509.33:551.524.3:551.577.3

Gabilly, A., **Prévision météorologique à longue échéance.** [Long range weather forecasting. *La Météorologie*, Paris, Ser. 4, No. 43:171–189, July/Sept. 1956. 12 figs., 2 tables, 3 refs. English and Spanish summaries p. 171–172. **DWB**—Previous long range forecast studies have been based on monthly mean anomaly charts; the present work uses a bi-monthly period (i.e., Dec.–Jan.–Nov.–Dec.) and is supported by a climatological study of the movement of the bi-monthly mean centers of annual + or − pressure anomalies (using Dec. 1949–Dec. 1954 data) for the Northern Hemisphere (except Asia). The progressive movement of these centers is sometimes regular and persistent enough to give an advantage over chance or climatology. Tests were made of forecast skill compared with persistence, and for France (broken down by subregions) for forecasts of temperature and precipitation anomalies for 2-month periods. The statistical verification seems to show some skill. Each situation (and its development) during the 5-year period is described in some detail and verification shown graphically, as well as in tables. (*Same item as* 8.9–148, Sept. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Long range temperature forecasting 2. Long range precipitation forecasting 3. Bi-monthly pressure anomaly charts 4. France.**—*M.R.*

11G–143 551.509.312

Hašek, Milan and Šidák, Zbyněk, **K problému verifikace předpovedí vyjádřených čísly.** [Verification of quantitative forecasts.] *Meteorologické Zprávy*, Prague, 9(5/6):141–144, 1956. fig. table, 15 refs., 12 eqs. Russian, English and German summaries p. 141. **DWB**—Methods of verification of forecasts of meteorological elements expressed in numbers in a time series are described as well as those of the pressure field. Both problems lead to the same mathematical formulation but their differences are respected whenever meteorological considerations make it necessary. Known methods of verification are reviewed, a critique of verification by means of the correlation coefficient is given and possibilities of its correct application are shown. New verification methods and use of weighting in the verification of the pressure field are proposed. However, this involved problem of weighting is not treated exhaustively and it is hoped that further contributions on this subject will be forthcoming from meteorologists. (*Same item as* 8F–55, June 1957, *Met. Abstracts.*) *Subject Headings:* **1. Forecast verification.**—*Authors' abstract.*

11G–144 551.509.33

§Kletter, L., **Praktische Erfahrungen mit einer neuen Methode zur Ausarbeitung mittelfristiger Wetterprognosen.** [Practical experiences with a new method of working out medium range forecasts.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 9(2):264–293, 1956. 13 figs., 2 tables, 9 refs. German, English and French summaries p. 264–265. **DWB**—In summer 1955 experimental 5-day forecasts were made at Vienna using 5-day 850 mb Northern Hemisphere charts, trend charts $(h_{-2}+2h_{-1}+5h_0+2N)/10$; N = normal topography, trend tendency charts, and zonal wind profiles. Correlation of trend charts with actual was 0.84–0.99, of trend tendency (5-day forecast) 0.02–0.97. The weather of the summer at Vienna is then considered; 8 periods of disturbed or fine weather are discussed synoptically and the forecasts analyzed. The advantages of the series kinematic—trend—trend tendency are pointed out. (*Same item as* 7.9–112, Sept. 1956, *Met. Abstracts.*) *Subject Headings:* **1. Extended forecasting 2. Austria.**—*C.E.P.B.*

11G–145 551.509.323:551.501.5:518.3

Kopáček, Jaroslav, **Grafický výpočet noční minimální teploty.** [Graphical computation of nocturnal minimum temperature.] *Meteorologické Zprávy*, Prague, 9(5/6):134–141, 1956. 3 figs. 3 tables, 5 refs., 7 eqs. Russian and German summaries p. 134. **DWB**—The applicability of Brunt's formula is considerably extended by introducing the factor R_N which takes account of any given cloud height and amount of cloudiness, even if there are several cloud layers. For easier computation several nomograms were constructed (and are presented) which replace all calculation. Using these nomograms minimum temperatures were computed for Hradec Králové for April and May 1954. In 93% of all cases the error was less than 3°C; in 69% it was less than 1.5°C. (*Same item as* 8.9–145, Sept. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Minimum temperature forecasting 2. Nomograms 3. Hradec Králové, Czechoslovakia.**—*Transl. of author's abstract.*

11G–146 551.509.3(02) 551.511

§†*Martin, Donald E., **Forecasting rules and techniques used in Tokyo Weather Central.** *U. S. Air Weather Service. First Weather Wing, Tokyo, Special Study* 105-2, Aug. 8, **1956.** 141 p. 2 plates, 33 figs., 26 refs., eqs. **DWB**—A substantial manual setting forth and illustrating with many synoptic examples (1955–56) the objective methods of forecasting for the Far East (at Tokyo) using the Vorticity-Space-mean anomaly techniques (developed from Rossby equation) for 500 mb charts (and auxiliary charts) leading to 1000 mb prog charts and specific forecasts for various points. Techniques for constructing and analyzing each chart are systematically presented. Evaluation of methods (verification) is also considered. Computing tables and nomograms are appended. (*Same item as* 9.2–42, Feb. 1958, *Met. Abstracts.*) *Subject Headings:* **1. Forecast manuals 2. Vorticity anomaly forecasting techniques 3. Rossby vorticity theory 4. Tokyo, Japan 5. Far East.**—*M.R.*

11G–147 551.509.5:551.509.31:519.24

White, Robert M. and Galligan, Agnes M. (*both, Air Force Cambridge Research Center, Cambridge, Mass.*), **Comparative accuracy of certain statistical and synoptic forecasting techniques.** *American Meteorological Society, Bulletin*, 37(1):1–7, Jan. **1956.** fig., 5 tables, 4 refs., 3 eqs. **DWB, DLC**—A series of 125 daily forecasts of the pressure-height distribution at 1000, 500 and 200 mb at eight stations in the eastern United States were prepared during the winter of 1953–54 by means of a statistical technique employing empirical influence functions. The technique, described by WHITE and PALSON, is an elaboration of procedures originally discussed by WADSWORTH. The results of this forecasting experiment are discussed, and a comparison of the accuracy of such forecasts with those prepared by standard synoptic techniques is made. The accuracy of the statistical forecasts were found to be comparable to those made by synoptic techniques. *Subject Headings:* **1. Synoptic forecasting 2. Statistical techniques 3. Forecast accuracy.**—*Based on author's abstract and introduction.*

11G–148 551.509.56:551.515.4:551.576.1

Žak, M., **O pretskazivanju grmljavina.** [Forecasting of thunderstorms.] *Yugoslavia. Hidrometeorološka Sluzba, Vesnik*, 5(3/4):117–119, July/Dec. **1956.** fig., 3 tables. **DWB**—The reliability of the appearance of altocumulus castellatus clouds as an indicator of thunderstorm occurrence was tested by observations made at Pančevo in June and July 1955 and 1956. Ac cast. was observed on 18 occasions and thunderstorms followed in all cases but one. In 7 out of these 17 cases thunderstorms occurred 1–4 hrs after the appearance of Ac cast., in 7 cases 7–10 hrs and in 3 cases 14–16 hrs after Ac cast. observation. (*Same item as* 9.3–162, March 1958, *Met. Abstracts.*) *Subject Headings:* **1. Thunderstorm forecasting 2. Altocumulus castellatus clouds.**—*G.T.*

1957

11G–149 551.509.5:551.509.313:551.509.317

Berggren, R., **On the accuracy of 500 mb analysis with special reference to numerical forecasting.** *Tellus*, Stockholm, 9(3):323–340, Aug. **1957.** 7 figs., 6 tables, 16 refs. **DWB, DLC**—The result of an analysis experiment is discussed. From 29 different analyses of one and the same 500 mb chart, certain parameters were calculated. The standard deviations of the height of the 500 mb surface had an average value of 15 gdm, determined over an area of 4200×8100 km. The correlation coefficient between the observed changes forecast with a numerical barotropic forecast varied between 0.53 and 0.77 (24 h), 0.77 and 0.84 (48 h), respectively. Some other verification parameters are given. Calculations of the geostrophic wind are carried through for all analyses, at points, over areas and along certain tracks. The deviations due to the differences in analysis are sometimes considerable. (*Same item as* 9.9–131, Sept. 1958, *Met. Abstracts.*) *Subject Headings:* **1. Upper air analysis 2. Barotropic models 3. Numerical forecasting errors 4. Forecast verification.**—*Author's abstract.*

11G–150 551.509.313:551.542

†Chaplygina, A. S., **O chislennykh metodakh prognoza baricheskogo polia v atmosfere.** [Numerical methods of forecasting the atmospheric pressure field.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 6:823–826, June **1957.** 2 tables, 24 refs., 3 eqs. **DLC**—An attempt is made to systematize the data on numerical forecasting published during 1951–56 in order to determine the degree of success of different methods in forecasting the pressure field in the middle troposphere (forecasting changes in 500 mb surface). The coefficients of correlation between prognostic and actual variations at 500 mb obtained by methods of forecasting for the same initial data and the mean correlation coefficients between actual and forecast variations of 500 mb for different forecasting methods are presented in tables. The results obtained with various models are analyzed. It is concluded that the experimental forecasts published in the meteorological literature outside the

U.S.S.R. show that the precision of forecasting the pressure field at 500 mb by numerical methods are more exact than those obtained by usual synoptic forecasting. (*Same item as* 10.3–167, March 1959, *Met. Abstracts.*) *Subject Headings:* **1. Numerical pressure forecasting 2. Forecast verification 3. Forecast accuracy.**—*I.L.D.*

11G–151 551.509.313:551.511:551.513.1

Duvedal, T., **Model for advection of pressure tendencies on surface charts and advective tendencies on thickness charts.** *Annalen der Meteorologie*, Hamburg, 8(3/4):64–72, **1957.** 15 figs., table, 3 refs. **DWB, DLC**—The numerical forecasting of prognostic charts with the aid of the barotropic model on the electronic computer gives streamline patterns at 500 mb, but in routine forecasts a prognostic sea level chart is more convenient. For this purpose observed 3 hr pressure tendencies are used in Sweden, in order to extrapolate 24 hr changes. The observed three-hr pressure tendencies are used to construct a sea level chart with the aid of the conventional prognostic method. After this a 24-hr prognostic chart for thickness 1000–55 mb is made by using previous 24 hr thickness and predicted position of fronts. The resulting prognostic 24-hr thickness chart is added to the prognostic sea level charts which result in a prognostic 500 mb chart. The routine of computation by the electronic calculator is described and the relevant formula is given. Twelve and 24-hr forecasts for selected weather situations were made and computed and observed sea level and 500 mb charts for selected areas of Europe are presented. The correlation between the computed 24-hr change and observed change of topography and the "skill" (S) computed by the formula $S=\frac{R\phi(PA_2)-R\phi(AA_v)}{1-R\phi(AA_v)}$ are presented ($R\phi(AA_v)$ =correlation between observed topography A, at time 0, and observed topography A_v at time t, and $R\phi(PA_v)$ =correlation between computed topography P and observed topography at time t). The results for both the forecasts made by means of a barotropic model and with numerical methods are presented in a table. The advective method yielded for the 100 mb prognostic chart, a correlation coefficient of chart +0.80 and a mean error between 20 m and 40 m which means a slightly better result than that of the prognostic sea level charts made at the Swedish Weather Service. The correlation for the 500 mb chart is more variable. In general on both instances the barotropic model gives slightly higher correlation coefficients but the advective method is quite promising. (*Same item as* 11C–62, March 1960, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting 2. Pressure tendencies 3. Prognostic charts 4. Barotropic models 5. Sweden.**—*I.L.D.*

11G–152 551.509.52:551.557

†*Ellsaesser, H. W., **Investigation of the errors in upper-level wind forecasts.** *U. S. Air Weather Service, Technical Report*, AWS TR 105-140/2, Nov. **1957** (released Dec. 16, 1959). 58 p. 8 figs., 16 tables, 20 refs. **DWB.** "A briefer report, with title **Errors in upper-level wind forecasts,** was issued as *Technical Report* 105-140/1, Nov. **1957,** and changes in that report issued as *Technical Report* 105–140/1a, Nov. **1957.**" (Both released Dec. 1959.) **DWB**—In this report [*TR* 105-140/2] errors of prognostic winds at 700, 500, 300, 200, and 100 mb are analyzed. The errors discussed are a measure of the wind-forecasting accuracy achieved by the U. S. and British weather services in mid-latitudes (25 deg. to 65 deg. N) up to and including 1954. The errors resulting from conventional forecasting techniques are compared to those obtained using persistence and climatology. The factors influencing forecast errors are discussed and recommendations are made for reducing errors due to technique. Details of the analysis including charts, figures, and tables are given. *Subject Headings:* **1. Upper air wind forecast accuracy 2. Forecast errors.**—*From author's abstract.*

11G–153 551.509.2:621.397.9

Farquharson, J. S., **Television forecasting by the British Broadcasting Corporation.** *Meteorological Magazine*, London, 86(1026):354–358, Dec. **1957. DWB**—Problems faced by the forecaster who presents several charts to the public over BBC at 6 p.m. each day, are reviewed, and the nature of the charts and substance of TV broadcasts, forecasts over radio (5:55 p.m.), verification and checking of broadcasts and forecasts, suggestions for improvement, etc. are discussed. *Subject Headings:* **1. Television weather broadcasts 2. BBC forecasts 3. Great Britain.**—*M.R.*

11G–154 551.509.5:519.2

Gleeson, Thomas A., **On limitations to prediction.** *Journal of Meteorology*, 14(4):304–307, Aug. **1957.** fig., 2 tables, 7 refs., 14 eqs. **DWB**—An expression is obtained for the limit to certainty of perfect prediction, in terms of the amount of verification data and the detail of the predictand. Related expressions are developed for the number of effective predictors that may be combined in a given prediction method, and for the fineness of predictand detail that can be forecast. Applications to evaluation of practical forecast problems are discussed by use of examples. Similar treatment is suggested for specification problems. Because of the generality of their derivations, it is believed that these expressions would be useful in other fields, as well as in meteorology. (*Same item as*

8.11–151, Nov. 1957, *Met. Abstracts.*) *Subject Headings:* **1. Forecast accuracy 2. Statistical analysis.** —*Author's abstract.*

11G–155 **551.509.33**

Hess, P. and Hofmann, A. (*both Frankfurt a.M.*), **Medium-range forecasting techniques for Central Europe, Pt. 1.** Germany. Deutscher Wetterdienst, Contract AF 61(514)-646-C, Final Report, June **1956.** 42 p. 23 figs., 9 tables, 3 refs., eqs. Also **Pt. 2** by A. Hofmann et al., Contract AF 61(514)-954, Final Report, Sept. **1957.** 42 p. 12 figs., 8 tables, 15 refs.—In the first part of the study a statistical method is described (multiple correlation table), whereby 24, 48, 72 and 96-hr changes of surface and 500 mb pressure are predicted daily for 15 grid points in Europe. The ten predictors used are discussed in detail. Both punch card and manual sorting have been tried and the latter proved much faster. The forecast procedure is described and an example of its application is given. In addition to the statistical method the second paper deals with a method of isopleth extrapolation and with its combination with the statistical method. Further a method of "sliding forecasts" (with a longer forecast period than the extended forecasts) is described and its application to the winter 1956/57 is demonstrated. An accuracy of 78% is obtained by this method for Central Europe for forecast periods of an average 10-day duration. The method involves combined use of statistical parameters, periodicities and other forecasting indices. (*Same item as* 9G–110, July 1958, *Met. Abstracts.*) *Subject Headings:* **1. Extended forecasting 2. Statistical forecasting 3. Forecast verification 4. Punched card applications to forecast verification 5. Central Europe. I. Diehl, H. II. Dinies, E. III. Seidel, G. IV. Trenkle, H.**—*G.T.*

11G–156 **551.509.33**

Hofmann, Alfred, **Stand und Entwicklungsmöglichkeiten von Monatsvorhersagen für Deutschland.** [Status and possibilities for the development of monthly forecasts for Germany.] *Annalen der Meteorologie*, Hamburg, 8(3/4):73–79, **1957.** fig., 8 refs., 8 tables. **DWB, DLC.** Also: His **Monthly forecasts for Germany; 6 year verifications.** Germany. Deutscher Wetterdienst, Contract AF 61(514)-646-C, Scientific Report, No. 3, June **1956.** 15 p. 6 tables, 6 refs., eqs.—The successfulness of 30-day forecasts which are being made in Germany for Central Europe is examined on the basis of two series of such forecasts from the period February 1950 to January 1956. The 30-day forecasts of the German Weather Service include deviations from mean monthly temperatures, anomaly of total monthly precipitation and approximate temporal location and duration of an unusual weather situation. Specific instances of such forecasts for West Germany for March 1955 and February 1955, for the Northern Hemisphere (by the U. S. Weather Bureau) for February 1950 and for Germany for March 1955 are presented. The verifications of these forecasts as well as those of three forecast series classified by season made by the German Weather Bureau and by the U. S. Weather Bureau are compared and analyzed. In the case of temperature, the U. S. forecasts correspond to random performance and in every season are worse than persistence forecasts. In the German forecasts, the spring temperature forecasts are useless and while the summer forecasts are better than chance they are within the range of persistence forecasts. For fall a slight improvement is perceptible; it reaches 21% in winter, that is 9% better than persistence forecasts. The precipitation forecasts are qualitatively similar. It is evident that a world wide forecast such as that prepared by the U. S. Weather Bureau gives an illusion of high precision for Germany but otherwise is actually worthless; this does not reduce its possible validity for other regions. Further work along the same procedures in Germany appears to be valueless. *Subject Headings:* **1. Monthly weather forecasts 2. Long range forecasting 3. Forecast verification 4. Germany.**—*I.L.D.*

11G–157 **551.509.311:551.515.1**

Kasuya, M. (*comp.*), **On the rapid development of a cyclone over the sea off the East Coast of Kanto on 25th to 26th December 1955.** *Journal of Meteorological Research*, Tokyo, 9(7):485–498, July **1957.** 16 figs., 4 tables, 5 refs., 10 eqs. In Japanese; English summary p. 485. **DWB, DLC**—This is the summarized report of the discussions made at the meeting of forecasters from the stations in the coastal regions of Kanto district in November, 1956. Weather forecasters frequently miss sudden changes in the intensity of low or high. In this report, forecasts of the rapidly developed low of December 25–26, 1955 were examined. The graphical forecasting methods by Estoque's Model I and II have been tested on this case and some successful results were gained as follows:

	25 Dec. 1955 000 I	25 Dec. 1955 1200 I
Model I	0.79	
Model II	0.92	0.86 (0.71)

The above table shows that Model II was better than the Model I. These methods are useful for predicting cyclone development, but are less satisfactory for mature cyclone, especially in the decaying stage. *Subject Heading:* **1. Cyclone development forecasting.**—*Author's abstract.*

11G–158 551.509.33

Khrabrov, Iu. B., **O sostavlenii mesiachnykh prognozov pogody s umen'shennoĭ zablagovremennost'iu.** [The compilation of monthly weather forecasts with reduced preparation time.] *Meteorologiia i Gidrologiia*, No. 10:30–33, Oct. **1956.** 7 refs. **DWB, DLC**—In the preparation of long range forecasts by the Central Institute of Forecasting, one of the principal obstacles in using various forecasting inferences was the extreme earliness in the final selection of the annual analog for making the monthly forecast. The preparation of long range forecasts (which began 40 days before the actual effectiveness of the forecast itself) up to 1956 is described. The new procedure for preparing such forecasts and their statistical verification is based upon the following variations in synoptic processes: (a) the nature of the synoptic processes according to the tendency of the synoptic season and the character of the crisis process as propounded by B. P. MULTANOVSKIĬ and others and (b) the nature of the mid-seasonal air temperature anomaly of the approaching season (E. I. BORISOV et al.). The preparation of long range forecasts for the individual months by the new method which shortens the period of preparation is described. (*Same item as* 9G–113, July 1958, *Met. Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Forecasting techniques 3. Forecast verification.**—*I.L.D.*

11G–159 551.509.5

Koo, Chen-chao (*Inst. of Geophysics and Met., Academia Sinica*), **The evaluation and utilization of weather forecasting from the viewpoint of communication theory.** *Acta Meteorologica Sinica*, Peking, 28(4):256–263, **1957.** 10 tables, 8 refs., eqs. In Chinese; English summary p. 263. **DLC**—Introducing the notion and technique of communication theory, the author shows that the evaluation of weather forecasting could be improved. The information index is used as an index of evaluation. It is also pointed out that any modification of the forecast done arbitrarily must decrease its value as an information. *Subject Headings:* **1. Forecast utilization 2. Information theory.**—*Author's abstract.*

11G–160 551.509.313

Petterssen, Sverre; Estoque, M. A. and Hughes, Lawrence A., **An experiment in prognostication.** *Journal of Meteorology*, 14(3):191–205, June **1957.** 13 figs., 5 tables, 9 refs. **DWB**—For 11 Jan.–21 Feb. 1956 (except week-ends) barotropic forecasts for 500 mb and baroclinic forecasts for 1000–500 mb layer were graphically subtracted to give 1000 mb prognoses, which were verified according to a scheme proposed by PETTERSSEN in 1956. Graphical and adjusted prognoses and verifications are given for each day. The sea level prognoses were good in the east but not in the west (Rocky Mountain area). Adjusted prognoses averaged slightly better than National Analysis Center forecasts. This also applied to 500 mb prognoses but with some uncertainties. (For abstract on this paper from another source, *see* 8.4–134, April 1957, *Met. Abstracts.*) *Subject Heading:* **1. Numerical forecasting techniques.**—*C.E.P.B.*

11G–161 551.509.33

Reuter, Heinz, **Über die Voraussage zeitlich gemittelter Höhenkarten für Zwecke mittelfristiger Wetterprognosen.** [Forecasting time-averaged upper air charts for medium range weather forecasts.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(4):433–438, **1957.** 3 refs., 6 eqs. German, English and French summaries p. 433–434. Also: Kletter, Leopold, **Grenzen der Anwendbarkeit und Erweiterung der Trendmethode von Namias.** [Limits of application and extension of the Namias trend method.] *Ibid*, p. 439–445. table, 4 refs., 22 eqs. German, English and French summaries p. 439–440. **DWB**—REUTER suggests an improvement in NAMIAS' trend method of 3-day forecasting, combining a 24 hr forecast chart with the statistical procedure. A trial with 850 mb charts for Central Europe was successful. KLETTER shows that NAMIAS' method is only applicable when the trend is towards normal. He designed an extended trend formula giving forecasts 36 hrs further ahead. (*Same item as* 8.5–165, May 1957, *Met. Abstracts.*) *Subject Headings:* **1. Extended forecasting.**—*C.E.P.B.*

11G–162 551.509.5:551.515.4:551.577.37

Shishkin, N. S., **O prognoze groz i livneĭ po metodu sloia.** [The prediction of thunderstorms and rainstorms by the "layer" method.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:14–20, **1957.** fig., table, 6 refs., 9 eqs. **DLC, DWB**—The method of forecasting thunderstorms and heavy showers developed in the Central Geophysical Observatory is based upon the layer method developed by J. BJERKNES. Equations for determining the magnitude of clouds are derived, namely

$$S = 10\,\frac{\gamma - \gamma_M}{\gamma_D - \gamma_M} \text{ and } \quad S_M = 10\left(1 - \sqrt{\frac{\gamma_D - \gamma}{\gamma_D - \gamma_M}}\right)$$

where S is expressed in both γ, γ_M and γ_D-actual, and dry adiabatic vertical temperature gradients. The problem of forecastingt hunderstorms and rain showers can be solved generally by giving

S in formula

$$\Delta\left(\frac{W_M^2}{2}\right) = C_p\left[(\gamma - \bar{\gamma}_M) - 0.1S(\gamma_D - \bar{\gamma}_M)\right]\Delta H$$

different values of 0, 1, 2 . . . and calculating the thickness of clouds for different amounts of cloudiness. The procedure for forecasting for an area 500×500 km is outlined. On an aerological diagram is found (1) the level of condensation to which corresponds the point of intersection of the line of specific humidity, which passes through the dew point at the earth's surface and (2) the dry adiabatic which passes through the point of surface temperature to be predicted. The sum of deficit of dew points at 850, 700 and 500 mb is determined. A computational table for forecasting thunderstorms and heavy showers (given in text) is constructed for a specific forecast. The verification of this procedure varied for different regions. For the following areas: Azerbaidzhan, Armenia, Kazakhstan and Ukraine, for the Upper Volga, Far Eastern, Transbaikal, Western Siberia, Privolzhe, Northern Caucasus, Urals and the central and central black soil oblasts, the verification was 87% for 292 experimental forecasts; for the Byelorussian, Latvian and Estonian Republics, Primore', Sakhalin and Yakutia, the verification was 57% for 152 forecasts. *Subject Headings:* **1. Thunderstorm forecasting 2. Rainstorm forecasting 3. U.S.S.R.**—*I.L.D.*

11G–163 551.509.33:551.509.318

Shtabova, A. I., **K voprosu o sposobe sostavleniia prognoza pogody na tri dnia.** [A method of preparing weather forecasts for three days.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 63:87–96, **1957.** fig., 6 tables, 3 refs. **DLC**—Daily forecasts are made for the next 3 days in the long range forecast section of the Central Forecasting Institute at Moscow (Ts.I.P.) and in a long range forecast group of the Ukrainian Hydrometeorological Service (V.G.M.S.). No special methods have yet been worked out. Attempts at using the natural synoptic period have not been successful. The author has been attempting to use the method of Natural Synoptic Processes (e.s.p.) of G. Ia. Vangengeĭm (1933), lasting for 3–6 days (occasionally 2–9 days) over natural synoptic regions. Statistical tables show the duration frequency of elementary synoptic periods of varying length for each year (1938–1950) and the average and by months, for the whole period. Method was tested over a period of 7 months (1955–6). The following results were obtained:

	cases	1 day	2–3 days of e.s.p.	
Surface	58	88%	79	85%
500 mb	58	90%	79	89%

Broken down by months (Aug.–Feb.) the 2–3 day surface forecasts verified from 60% (Feb.) to 100% (Oct.), and the 500 mb charts 70% to 100% (average 89%) or better than the surface charts. The method is based on correlations between the baric field (type) of the first day of the e.s.p. with that of the last day of the e.s.p. Very few of the cases last beyond 3 days, especially in spring and fall. *Subject Headings:* **1. Extended forecasting methods 2. 3-day forecast verification 3. Natural synoptic processes 4. Soviet long range forecast methods.**—*M.R.*

11G–164 551.509.31:551.509.5:551.524:551.577

Tomashevich, L. V., **Razbor neudachnogo prognoza pogody na 2/V 1954 g.** [Analysis of an unsuccessful weather forecast for May 2, 1954.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 52:35–39, **1957.** 3 figs., 2 refs. **DLC**—The weather forecast for Moscow for May 2, 1954 failed to predict correctly both temperature and precipitation since rainfall was recorded for all stations, and the temperature was lower than predicted by 10°C. A detailed analysis of the synoptic situation at the time when the forecast is made and of the reason for its failure is presented with the aid of synoptic maps. *Subject Headings:* **1. Weather forecasting 2. Forecast errors 3. Synoptic analysis 4. Moscow, U.S.S.R.**—*I.L.D.*

1958

11G–165 551.509.314:519.2

Arléry, R., **Quelques précautions à prendre quand on désire apprécier correctement la réussite de certaines prévisions quantitatives.** [Some precautions to take when one desires to appraise correctly the success of certain quantitative forecasts.] *La Météorologie*, Paris, Ser. 4, No. 50:103–107, April/June **1958.** 4 figs. French, English and Spanish summaries p. 103. **DWB**—Without having recourse to strict demonstrations of calculation of probabilities, it is shown on an example that knowledge, even imperfect, of the statistical distribution of a meteorological variable makes it possible, relying solely on the laws of chance, to make approximate quantitative forecasts. The percentages of success of such forecasts are examined. Afterwards—for the benefit of amateur forecasters—it is stressed that under those conditions, a forecast method cannot attract attention

unless the results it provides constitute a true progress, in respect of the success due to simple application of those laws of chance. *Subject Headings:* **1. Forecast verifications 2. Statistical forecasting.**—*Author's abstract.*

11G–166 551.509.5:551.509.313

Berggren, Roy, **A comparative study of 700, 500 and 300 mb barotropic forecasts.** *Geophysica*, Helsinki, 6(3/4):147–167, **1958.** 3 figs., 4 tables, 13 refs. **DWB, DLC**—A comparison is made between 700, 500 and 300 mb barotropic forecasts. Error charts as well as tables with different verification parameters are used. A discussion is also given of the effect of differences between base analyses. The distribution of absolute geostrophic vorticity is discussed. By an example it is shown that differences between analyses may give rise to quite different results when computing vertical velocities with the aid of the vorticity equation. (*Same item as* 11C–21, March 1960, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting errors 2. Upper air analysis 3. Forecast verification.**—*Author's abstract.*

11G–167 551.509.5:551.509.313:551.509.317

Berggren, Roy, **Comparative studies of 500 mb barotropic forecasts based on different analyses.** *Tellus*, Stockholm, 10(3):289–298, Aug. **1958.** 3 figs., 7 tables, 11 refs., 5 eqs. **DLC**—Some barotropic 500 mb forecasts are compared in the following ways: 1) comparison of the differences between forecasts made from analyses with identical boundary regions but different inner parts; 2) comparison of forecasts made from two independent analyses based on identical material; and 3) comparison between forecasts based on two analyses with identical inner region but different boundary regions. The result of a computation of the standard deviation of the vorticity and the Jacobian $J(\eta,\phi)$ is given and discussed, the deviation being due entirely to the personal factor in upper air analysis. (*Same item as* 10.7–161, July 1959, *Met. Abstracts.*) *Subject Headings:* **1. Barotropic models 2. Numerical forecasting errors 3. Upper air analysis 4. Forecast verification.**—*Author's abstract.*

11G–168 551.509.313:551.509.5

Černava, Sáva; Kuboš, Milan and Pechala, František, **Numerická prědpověď 24 hodinově tendence AT 500 mb.** [24-hour numerical forecasting of the barometric tendency for the 500 mb level.] *Meteorologické Zprávy*, Prague, 11(4/5):115–119, **1958.** 3 figs., 2 tables, 3 refs., 17 eqs. Russian and English summaries p. 115. **DWB, DLC**—The numerical method of preparing forecasts for the 500 mb level described in the Soviet manual **"Rukovodstvo po korotkosrochnym prognozam pogody"** (1955) [Manual of short-range weather forecasting] is explained and results of a verification of the method are reported. The verification was performed for 13 cases by measuring differences between computed and actual values of 500 mb height changes at 63 points of a grid covering the area between 40° and 70°N and 40°W to 40°E, by 10 degrees latitudinally and 5 degrees longitudinally. The percentage of accurate forecasts is tabulated for required accuracies of within 4, 5, 6 and 8 dekameters. For an accuracy within 8 decameters (sufficient for flight forecasts but not for more exacting synoptic work) the verification score was 70–85% for 24-hour forecasts. The method is practical because of its ease (a group of 3 trained forecasters can prepare a 24-hour forecast in 6 hours). *Subject Headings:* **1. Numerical forecast accuracy 2. Forecast verification.**—*G.T.*

11G–169 551.509.52

Durst, C. S., **Probable errors in forecast winds.** *Institute of Navigation, London, Journal*, 11(2):180–187, April **1958.** 3 figs., 3 tables, 4 refs. **DLC**—The basic information in this paper is intended to demonstrate the reliance that a pilot or air navigator can put on his imminent winds in different parts of the world, in different seasons and at different heights. The basic statistical data, the standard charts with respect to windage errors at various world positions are illustrated. From the meteorological point of view conclusions have been reached showing heights at which forecasts are most likely to be inaccurate, most liable to be in error, regions where the distribution of errors is meridional rather than zonal, knots at which inaccuracy of forecasts occurs, and belts where smaller errors are liable. *Subject Headings:* **1. Wind forecasting errors 2. Aviation forecasting.**—*N.N.*

11G–170 551.509.5

Green, S. W., **A comparison of forecasts.** *Weather*, London, 13(12):408–410, Dec. **1958.** table. **DWB**—The author and his wife kept a careful check on the accuracy of the morning BBC forecasts, the newspaper forecasts found in the Manchester Guardian (prepared the previous afternoon), and forecasts made about 8 a.m. without benefit of weather maps or other forecasts by himself and his wife, respectively, on 100 days in 1957. The ex-forecaster and his wife both scored 53½%, the BBC 63½ and the newspaper 43½% correct. The BBC was correct 54 times, incorrect 27 times and doubtfully correct 19 times, or in other words right twice as often as wrong. The newspaper was wrong 47 times and right only 34 times. The author's wife had no scientific knowledge of weather. *Subject Headings:* **1. Forecast accuracy 2. Amateur forecasts 3. England.**—*M.R.*

11G–171 551.509.312:551.511

Kusano, K., **On the inspection of graphical barotropic prediction and its correction by means of CAV trajectory.** *Journal of Meteorological Research*, Tokyo, 10(5):376–382, May **1958.** 6 figs., 5 tables, 4 refs., 6 eqs. In Japanese; English summary p. 376. **DWB.** Also issued as: *Sendai, Japan. Central Meteorological Observatory, Journal of Meteorological Research of Tohoku District*, Vol. 12, Memoir No. 3, March 1959. 7 p. 6 figs., 5 tables, 4 refs. **DWB**—The method of graphical integration based on the barotropic model has been introduced in routine work at Sendai DMO since Sept. 1955. In this paper, comparisons between calculated value of vorticity advection and observed 24-hour 500 mb height change in Sept. and Oct. 1957 are presented. There are 17 cases which are unsatisfactory with correlation coefficient less than 0.60. Most of them are due to cold vortex, cold trough, cut off low, typhoon, etc., because of over-drifting by $\overline{Z}$ fields. CAV Trajectory analysis is successfully applied to correct the overdrifting of these upper disturbances, though some cases were unsatisfactory because CAV Trajectory could not be drawn. (*Same item as* 10.10-174, Oct. 1959, *Met. Abstracts.*) *Subject Headings:* **1. Graphical prediction models 2. Barotropic models 3. Forecasting techniques.**—*Author's abstract.*

11G–172 551.515.2:551.509.3

Matano, H. (*Met. Res. Inst., Kyoto Univ., Japan*), **A synoptic verification of the development of a tropical cyclone into a severe typhoon.** *Meteorological Society of Japan, Journal*, Ser. 2, 36(2):59–66, April, **1958.** 4 tables, 10 figs., eqs., 5 refs. **DWB, DLC**—The synoptic structure of Typhoon "Tess" (1953) over the tropical ocean is examined to verify the development of a tropical cyclone into a severe typhoon from the view point of NAMEKAWA'S theory of main and secondary typhoons. A hypothesis on the life cycle of a tropical cyclone is presented in conclusion. *Subject Headings:* **1. Typhoon "Tess" (1953) 2. Typhoon theories 3. Synoptic analysis of tropical cyclones.**—*Author's abstract.*

11G–173 551.509.5:551.524.36:551.571(942)

Mizon, E. A., **Quantitative forecasting of temperature and dew point.** (In: Fire Weather Conference, Melbourne, Australia, July 1958, **Proceedings,** issued Melbourne, **1958.** Conference Paper, No. 13 (12 p.) 6 tables, 2 refs., eqs.) **DWB**—An analysis is made of the forecast errors of maximum temperature at three stations representative of the three main forestry areas in South Australia for period November–April in the summers of 1956/57 and 1957/58. An attempt is made to analyze minimum dew point forecasts for the 1956/57 season but lack of precise information from the areas concerned renders this inconclusive. As a measure of overall utility of forecasts for forestry purposes the concept of "effective temperature" is proposed. Forecasting accuracy and capability comparisons are made for the three areas. *Subject Headings:* **1. Maximum temperature forecasting 2. Dew point forecasting 3. Forecast verification 4. South Australia.**—*Author's abstract.*

11G–174 551.509.5:551.509.313:551.509.33

Namias, Jerome, *et al.* (*U. S. Weather Bureau, Wash., D. C.*), **Application of numerical methods to extended forecasting practices in the U. S. Weather Bureau.** *Monthly Weather Review*, Wash., D. C., 86(12):467–476, Dec. **1958.** 11 figs., table, 9 refs. **DWB, DLC**—Five-day forecasts of precipitation and temperature or of general circulation patterns, are now objective enough so that numerical prediction techniques can play an important role in their preparation. Areas where subjectivity still is important are outlined and results of recent temperature and precipitation forecasts verified to show the unusual skill score. The trend method, the summation method, the basic current method and verification procedures are discussed and illustrated. (*Same item as* 11C–148, March 1960, *Met. Abstracts.*) *Subject Headings:* **1. Numerical 5-day forecasting techniques 2. Extended forecast verification. I. U. S. Weather Bureau. Extended Forecast Section.**—*M.R.*

11G–175 551.5:519.2(02)

Panofsky, Hans A. (*Pa. State Univ.*) and Brier, Glenn W. (*U. S. W. B., Wash., D. C.*), **Some applications of statistics to meteorology.** University Park, Pa., College of Mineral Industries, The Pennsylvania State Univ., **1958.** 224 p. 21 figs., 45 tables, refs., eqs. **DWB, DLC** (QC874.P3)—A series of lecture notes used in a course in meteorological statistics at Penn. State Univ. prepared by PANOFSKY has been revised and supplemented by BRIER and further supplemented by J. LEITH HOLLOWAY (Smoothing and filtering) and H. C. S. THOM (Transformation of frequency distribution). ROGER ALLEN was co-author of the chapter on Forecast verification. The main chapters are: 1) Frequency distributions; 2) Theoretical frequency distribution; 3) Sampling theory; 4) Analysis of relationship between 2 variates; 5) Between more than 2 variates; 6) Time series; 7) Space variation of meteorological variables; 8) Statistical weather forecasting and 9) Forecast verification. A very thorough subject and author index is provided. Although a number of modern applications (such as the Incomplete Gamma Function) to meteorology are incorporated, the text does not presuppose any previous knowledge of statistics, but it is intended for advanced students of meteorology

with a good mathematical training. (*Same item as* 9.6–4, June 1958, *Met. Abstracts.*) *Subject Headings:* **1. Statistics in meteorology 2. Meteorological statistics textbooks 3. Statistical forecasting 4. Forecast verification.**—*M.R.*

11G–176 551.509.52:551.557

Saucier, Walter J., **Error analysis of geostrophic 300-mb numerical windspeed forecasts.** *U. S. Air Weather Service, AWS Technical Report*, 105–148, Sept. **1958.** 2 p. 2 figs. **DWB** (M(055) U58a)—A brief verification study is made of the eight sets of forecast and verification data obtained by the Detachment 2 of Headquarters Air Weather Service during July 28 to Aug. 1 and Aug. 4–8 1958. The forecast speed errors are accounted for in this report. The systematic error in the wind-speed forecast was small and positive, being −0.6 knots at 85°N +1.2 at 75°N +0.8 at 65°N +2.2 at 55°N +0.4 at 45°N and +0.4 at 35°N. These results represent summertime conditions. Winter speed errors might be different. (*Same item as* 11C–171, March 1960, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecast verification 2. Numerical wind speed forecasts.**—*N.N.*

11G–177 551.509.313:551.509.5

Suzuki, E. **On the verification methods of numerical weather forecasting.** *Journal of Meteorological Research*, Tokyo, 10(5):414–428, May **1958.** 2 figs., 3 tables, 9 refs., 3 eqs. In Japanese English summary p. 414. **DWB**—In order to verify the results of forecast, the test of independence of contingency table, and percentage test of success are used. Various verification scores and indexes were examined one by one, and reduction of variance by LORENZ (method of analysis of variance) conditional relative entropy of information and relative mean square error (X^2) are regarded as more powerful measures than the others. *Subject Headings:* **1. Numerical forecasting 2. Forecast verification.**—*From author's abstract.*

11G–178 551.509.5

Suzuki, E. (*Met. Res. Institute, Tokyo*), **Weather forecast and entropy in information theory.** *Papers in Meteorology and Geophysics*, Tokyo, 9(2):51–62, Dec. **1958.** 4 figs., 5 tables, 7 refs., eqs Japanese summary p. 62. **DWB**—Weather forecast is generally regarded as social information containing a certain kind of uncertainty, and so information theory must be very effective for the verification of forecast technique and forecast result. The author tries to introduce the idea of entropy in information theory to the various problems of weather forecasting, and shows that the several verification measures hitherto known were systematically based on ideas of relative entropy or transmitted amount of information in information theory. Moreover, as a by-product of such induction process, a simplified method of estimating correlation coefficient is offered, and an effective procedure for issuing weather forecasts under several restricting conditions is gained by the principle of maximum total entropies. Lastly, the hypothetical examples of such procedure and actual situations are schematically shown for the daily temperature forecasts. *Subject Headings:* **1. Forecast verification 2. Entropy. 3. Information theory.**—*Author's abstract.*

11G–179 551.509.312:629.13

*U. S. Air Force. 2d Weather Wing, Rhein Main Air Base, Germany, **Comparison of the accuracy of numerical and conventional prognostic charts and their value as flight planning tools.** Jan. **1958** 37 p. 23 figs., 4 tables. **DWB** (M:629.1325 U58com)—Daily 500 mb prognostic charts prepared by the Joint Numerical Weather Prediction Unit for the period Nov. 1956–July 1957 are used to compute equivalent headwind components along four standard air routes across the North Atlantic and over western Europe. The errors in these route winds are compared with those resulting from the use of conventionally prepared prognostic charts, persistence, and climatology as forecast tools. The growth of the wind error with time and route length obtained from each of these forecasts is examined for the purpose of determining at what point in time prognostic charts cease to have value as flight planning tools relative to the unskilled objective forecasts of persistence and climatology. (*Same item as* 11C–189, March 1960, *Met. Abstracts.*) *Subject Headings:* **1. Prognostic charts vs numerical forecasting 2. Flight planning 3. Forecast accuracy.**—*Author's abstract.*

1959

11G–180 551.509.313:551.509.5

Ambrózy, Pál; Götz, Gusztáv and Tänczer, Tibor, **Numericheskoe predskazanie absoliutnykh topografiĭ pri pomoshchi barotropicheskogo metoda Buleeva.** [Numerical forecasting of contour charts with Buleev's barotropic method.] *Időjárás*, Budapest, 63(2):74–81, March/April **1959** 4 figs., 3 tables, 6 refs., eqs. English summary p. 74; Hungarian summary p. 80–81. **DLC**—Fifty forecasts of the geopotential variations of the 700 mb surface were made on the basis of Buleev's method, which is one of the barotropic methods of pressure forecasting by means of graphical integration. Within the period examined, three series of 6 days each were chosen and subjected to a de

tailed analysis. Forecasts for 850, 700 and 500 mb based on the 700 mb displacement field are found to verify favorably, while those based on 500 mb displacement fields show poorer results. The effect of the Coriolis parameter is also analyzed and the conclusion is reached that taking it into consideration is justified only in meridional synoptic situations. *Subject Headings:* **1. Graphical prediction models 2. Barotropic models 3. Numerical forecasting evaluation 4. Forecast verification.**—*Authors' abstract.*

11G–181 551.509.5:551.509.317

Berggren, Roy, **Further studies on the accuracy of upper air analysis,** *Arkiv för Geofysik*, Stockholm, 3(2):41–51, **1959.** 2 figs., 3 tables, 4 refs. **DLC**—The necessity for improved, more uniform procedures in upper air analysis is well illustrated by the experiment discussed. A representative number of the 26 Swedish analysts came up with different results of the identical analysis of a 500 mb chart for 0300 GMT, Nov. 7, 1949 and a 300 mb chart for 0300 GMT, Nov. 4, 1956 which were analyzed and then repeated the following year. The analysts had free choice between direct analysis and the differential analysis techniques. With all these analyses on hand, the author computed the root-mean-square of the differences between the conventional and the numerical analysis techniques for all combinations of the chart. The results are presented and discussed. (*Same item as* 11C-22, March 1960, *Met. Abstracts.*) *Subject Headings:* **1. Upper air analysis 2. Forecast verification.**

11G–182 551.509.58:6

Borgman, L. E. (*Shell Development Co., Houston*), **Weather forecast profitability from a client's viewpoint.** *American Meteorological Society, Bulletin*, 41(7):347–356, July **1960.** 5 figs., 2 tables, 11 refs., 5 eqs. **DWB.** Also issued as: *Shell Development Company, Houston, Texas, Publication*, No. 197, [1959]. 27 p. 5 figs., 8 refs., eqs. "AMS meeting, Chicago, March 1959." **DWB**—The governing requirements in forecasting the weather for industrial operations are profitability and safety. Accuracy is also desirable but is not sufficient to guarantee utility. In order to be useful, the industrial meteorologist needs not only a knowledge of the weather but also a considerable economic insight into the industrial activities and problems of his client. Special attention has to be paid to the effect of each forecast on the profitability and safety of the client's operations. The meteorologist may need to hedge many of his forecasts or even to recommend that the forecasts not be used for some operations. Several examples of industrial problems in which these conditions arise are examined, and approximate methods for estimating the most profitable action are presented. The methods are first applied to an elementary forecast situation in which the occurrence or nonoccurrence of a weather event is forecast, and then the procedures are generalized to the more elaborate multivalued forecast situations usually encountered in industrial operations. *Subject Headings:* **1. Industrial forecasting 2. Forecast usefulness.**—*Author's abstract.*

11G–183 551.509.52:551.557

Durst, C. S. and Johnson, D. H., **The preparation of statistical wind forecasts and an assessment of their accuracy in comparison with forecasts made by synoptic techniques.** *Great Britain. Meteorological Office, Professional Notes*, 8(124), **1959.** 27 p. 6 figs., 11 tables, 9 refs., 13 eqs. **DWB**—The principles and practice of forecasting upper winds by linear regression equations are discussed. An account is given of the accuracy achieved by the statistical technique and by the current synoptic method during trials held for the first four months of 1955. The use of the statistical approach in deciding the effect on forecast accuracy of changing the distribution of observing stations is illustrated. *Subject Headings:* **1. Statistical forecasting 2. Upper air wind forecast accuracy.** —*Author's abstract.*

11G–184 551.509.52:551.557

Emslie, J. H., **Upper wind forecast verification—AFO Comox.** *Canada. Meteorological Branch, CIR*-3151, TEC-291, Jan. 20, **1959.** 5 p. 3 figs., 2 tables, 2 refs. **DWB, DLC**—Upper level forecast winds for AFO Comox for the period 2 Sept. to 30 Nov., 1957 have been checked against RAWIN reports within the area to check their representativeness in space and time. *Subject Heading:* **1. Upper air wind forecast accuracy.**—*Author's abstract.*

11G–185 551.509.58:656.71

*†Jenkins, Carl F. and Twitchell, Paul F., **Study and evaluation of two-hour objective terminal forecast techniques.** Melpar, Inc., Falls Church, Va., Contract AF 19(604)-2450, Final Report, June 1, 1957–Feb. 28, **1959.** 219 p. 30 figs., numerous tables, 74 refs.—The present study is concerned with testing and evaluating objective forecast techniques with an ultimate goal of developing a method for objectively forecasting terminal ceiling and visibility conditions over the 0–3 hour period. For the purpose the applicability of several known objective forecast techniques to the short range ceiling and visibility forecasting problems was determined. Methods reviewed include a screening technique, a factor analysis method, a graphic regression procedure, linear regression, and a contingency table method herein termed a grouping method. The results of the initial test and

evaluation study of these methods do not indicate that any of the objective methods tested der strate a skill for a two-hour forecast of ceiling or visibility superior to subjective forecasts or per ence. The three methods which approach acceptable operational limits are the grouping met graphical regression and the screening procedures. It is concluded that the factors contributin the lack of skill demonstrated by the tested forecast methods is not a function of the available dictors of present-data limitations. Other conclusions include suggestions for further developr of some of the methods, and the application of objective methods at the present state of developm *Subject Headings:* **1. Airport terminal forecasts 2. Ceiling and visibility forecasting 3. Objec forecasting 4. Forecast evaluation.**—*I.S.*

11G–186 551.509.5:551.509.312

Petersen, Gerald A. (*Chanute Air Force Base, Ill.*), **Results of various prognostic techni tested by the weather forecaster superintendent course, AAR 25300, Chanute Air Force B Illinois.** *American Meteorological Society, Bulletin*, 40(3):148–149, March **1959.** table, 5 **DWB, DLC**—The tabulated results of the composite, graphical REED, FJØRTOFT and ESTO procedures by date, time, and average absolute error (height, direction and velocity) are given the past two classes (17047 and 21087) upon completion of the 37-week mandatory course of aspi Warrant Officers. It is concluded that experience has a slight edge over the newer dynamical met as earlier tests have shown. *Subject Headings:* **1. Graphical presentation 2. Forecast verificatio** *W.N.*

11G–187 551.511.33: 551.509.312/313

Reed, Richard J., **Dynamical predictions for the Arctic; summer season.** Washington (St Univ. Dept. of Meteorology and Climatology, Contract AF 19(604)-3063, Scientific Report No Occasional Report No. 12, April **1959.** 52 p. 19 figs., 6 tables, 7 refs., 3 eqs. **DWB**—Forec of 1000 mb and 500 mb heights were prepared for the Arctic for a 20-day period in July, 1956. forecasts were based on a two-level baroclinic model; solutions were obtained by both graphical combined graphical and numerical integrations. The day-to-day performance of the metho revealed by correlations between predicted and observed heights and root-mean-square-errors, slightly better than for a similar Arctic series reported on by ESTOQUE and somewhat worse tha comparable forecasts at middle latitudes. From the geographical distribution of correlations errors, little evidence of important topographical influence was found. In general, the perform was best in regions where the synoptic activity was most pronounced. Since greatest activity curred in a region of sparse data north of Siberia and Alaska, there was little relationship betwee density of observations and the accuracy of the forecasts. In explaining the differences betwee results of this and other studies, it is necessary to take both the synoptic activity and the qualit the analyses into account. The combined graphical and numerical integrations verified wors both 1000 mb and 500 mb than the cruder and supposedly less accurate graphical integrati Thickness forecasts computed from the combined method were superior to those derived by the approximate technique. The reasons for these contradictory results are not clear. From a st of the algebraic mean thickness error, there appeared to be some evidence of nonadiabatic hea over continental regions and of cooling over oceanic areas. The magnitudes were too small to ously affect the forecasts. An investigation of the behavior of vorticity features revealed that underlying conservation principle was not too well obeyed, and that both the nonconservative and the large time interval employed in the integration contributed to the observed errors. erally speaking, the results confirm Estoque's conclusion that reasonably successful predictions sh be possible in the Arctic by dynamical methods once the data network is improved. Even with present network, useful results are obtained on a considerable number of occasions. (*Same ite* 11C–163, March 1960, *Met. Abstracts.*) *Subject Headings:* **1. Numerical forecasting for A 2. Arctic weather forecasting 3. Arctic.**—*Author's abstract.*

11G–188 551.509.311:551.515.8(

Stewart, Philbert G., **Investigation of cold waves at Chicago, Illinois.** Chic. Univ. Dept Meteorology, Contract AF 19(604)-2179, Scientific Report, No. 9 March **1959.** 20 p. 8 f 3 refs. Also included in its Final Report, Feb. **1960.** Ch. L. **DWB** (M(055) C532sr)—A st was made of 33 cold waves that hit Chicago in the 24 months of December and January 1945– (except January 1955), to determine possible objective parameters that would aid in forecasting t approximately 25 hrs ahead. Daily synoptic Northern Hemisphere-sea-land and 500 mb charts 1230 G.M.T. were used to forecast cold waves in the 24 hr period beginning at 2130 of the same A composite chart shows positions of 500 mb ridge lines and low centers at 500 mb and sea le indicating that as a rule ridges occurred over the British Columbia-Yukon-Gulf of Alaska area, u troughs in the Hudson Bay-Baffin Land region, and surface Lows in the Great Lakes area. S in evaluating parameters are clearly outlined and illustrated, and examples of surface and u level synoptic charts for North America during preforecast and post-forecast periods are presen

Results of tests on independent sample of 744 days showed that 44 days met conditions for forecasting a cold wave, and 33 of these verified according to strict specifications, whereas 8 of the 11 "failures" verified but missed by only a few degrees in all but one of the cases, and the remaining 3 verified one day later. The rules require (for Chicago) a drop of 20°F in 24 hrs to 10°F in the first half of December and to 5°F during the rest of the period under investigation. *Subject Headings:* 1. **Objective cold wave forecasting** 2. **Cold wave forecasting** 3. **Chicago, Illinois.**—*M.R.*

11G–189 551.509.312:551.511

Vanderman, Lloyd W.; Drewes, William J. and Hopp, Leo E., **Comparison of barotropic and baroclinic numerical forecasts and contributions of various effects.** *Monthly Weather Review*, Wash., D. C., 87(2):43–56, Feb. **1959.** 8 figs., 2 tables, 9 refs., 6 eqs. **DWB,DLC**—500 mb barotropic and 500 mb baroclinic cyclone and a quasibarotropic cyclone, are presented and compared. The barotropic forecasts did not indicate accurately the changes in circulation or the magnitude of the height falls ahead of the circulation maxima. 700 mb forecasts from the same initial times as the 500 mb barotropic and baroclinic forecasts, for each of the four terms of the frictionless vorticity equation, are presented. These 700 mb forecasts are compared with each other and in added combinations with the 700 mb verifications and with 700 mb barotropic forecasts. These comparisons are then used diagnostically in an analysis of the errors in the 500 mb barotropic forecasts. Each of the four terms of the vorticity equation is discussed. An explanation for the success of the barotropic forecasting model is suggested. Contributions of the horizontal velocity divergence, vertical advection of vorticity, and twisting terms to errors in the barotropic forecasting model are discussed in some detail. It is concluded that the major problem in developing a successful baroclinic forecasting model to substitute for the existing barotropic forecasting model is that determining in space and time an accurate approximation of the vertical profile of vertical motion. (*Same item as* 11C–191, March 1960, *Met. Abstracts.*) *Subject Headings:* 1. **Numerical forecasting errors** 2. **Barotropic models** 3. **Baroclinic models.**—*Author's abstract.*

11G–190 551.509.33:551.509.5

Vitel's, L. A., **Proverka metodiki prognoza sezonnykh kharakteristik tsirkuliatsii.** [Verification of a method of seasonal forecasting of circulation characteristics.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 89:60–65, **1959.** table, 3 refs. **DLC**—In 1949 [*GGO, Trudy*, 15(77)], the author proposed a method of long range forecasting of seasonal circulation characteristics as represented by the number of days with anticyclonic or cyclonic circulation over the southern half of European U.S.S.R. (7th synoptic region). The most definite prognostic indices were obtained for the summer season. In the above-mentioned paper the method was verified using a 39-year series (1901–1939) which included the years from which the prognostic relationships were obtained. The present paper contains results of a verification of the prognostic relationships in which new data, not included in the earlier series, were used. 18 seasonal forecasts for the summer seasons (June–Aug.) were prepared and verified for the years 1940–1957. The accuracy of these forecasts is found to be of the same order as that of the ones for 1901–1939 (83% not exceeding deviations of 20%). This confirms the validity of the prognostic relationships and their usefulness for operational purposes. *Subject Headings:* 1. **Seasonal forecasting** 2. **Forecast verification** 3. **European U.S.S.R.** —*Translation of Author's abstract.*

1960

11G–191 551.509.5

Appleman, Herbert S. (*Hdqs. Air Wea. Service, Scott AFB, Ill.*), **A fallacy in the use of skill scores.** *American Meteorological Society, Bulletin*, 41(2):64–67, Feb. **1960.** 5 tables, 7 refs. **DWB** —Evidence is presented to show that the form of the Heidke skill score commonly used to evaluate forecast procedures is not reliable for the purpose for which it is intended. This is primarily because the standard against which the forecast accuracy is tested is not a true standard, since it is a function of the forecasts issued. Thus, even when applied to the same representative set of data, it is entirely possible for one skilled forecast technique to have a higher skill score but a lower forecast accuracy than a second skilled technique or an unskilled technique. A new skill score is proposed which retains the useful characteristics of the common skill score without its drawbacks. Finally, some brief comments are made regarding the weighting of data in a contingency table to obtain operationally more useful skill scores. *Subject Heading:* 1. **Skill score.**—*Author's abstract.*

SUPPLEMENTARY MATERIAL

11G–192 551.509.5:551.509.33

Ur'eva, B. P., **Operativnaia obespechennost' dolgosrochnykh prognozov pogody maloi zablagovremennosti.** [Operational reliability of extended-range weather forecasts.] *Moscow. Tsen-*

tral'nyĭ Institut Prognozov, Trudy, No. 63:105–108, **1957.** 2 tables, 1 ref. **DLC**—A verification o the reliability of all extended-range weather forecasts of the Central Institute of Forecasts for 1 months of 1952 and 8 months (Jan.–Aug.) 1955 showed that the average percentage of all forecast for 3 days amounted to 88%. This number (88%) is formed by a 80% reliability of forecast prepared at the end of a current natural synoptic period for the beginning of the following period and by a 93% reliability of forecasts for 3 days within the current period. *Subject Headings:* **1. Ex tended forecasting 2. Forecast verification 3. Natural synoptic periods 4. U.S.S.R. Centra Institute of Forecasting.**—*A.M.P.*

11G–193 551.509.5:551.511.13:536.75:519.2

†van der Bijl, W. (*Koninklijk Nederland Met. Inst., de Bilt, Netherlands; Now Kansas State Univ. Manhattan, Kans.*), **Das statistische Entropieverhältnis, ein Hilfsmittel zur Lösung von Vorhersage problemen.** [The statistical entropy relation: an aid to the solution of forecasting problems. *Meteorologische Rundschau*, Berlin, 12(2):33–36, March/April **1959.** 2 figs., 14 refs., eqs. **DWB DLC**—In commenting upon E. W. WAHL'S paper **Statistical entropy relations as an aid in forecastin** (*see* 6.10–88, Oct. 1955, *MAB.*) the author compares the use of the skill score, *S*, in the formula ($S = B - Z/N - Z$) with the entropy relationship I. The comparison shows that I always gives the strength of the bond between the observed and the forecast values; a positive or negative relationship does not influence I. *S* on the other hand measures the number present in the principal diagonal and in that case it makes a fundamental difference whether the relation is positive or negative. Moreove I has a further advantage in that the distribution function of numerator and denominator of the en tropy relation is known. Relationships between x and y (predicted or observed meteorological values) can be tested for significance. This was impossible with "skill score" so that in the past there were used contingency tables whose relationship had no high statistical confidence. While the chi square test was applicable it required enormous expenditure of work. On the other hand I is com puted relatively easily. The author corrects WAHL'S statements of SHANNON and WEAVER'S postulate of the conditions for which $H = -\Sigma p_i \ln p_i$ and also applies the entropy relationship between sunspot and thunderstorms in the British West Indies (C. E. P. BROOKS) and compares the results with the chi-square analysis. *Subject Headings:* **1. Forecasting skill 2. Entropy 3. Statistical forecasting** —*I.L.D.*

11G–194 551.509.5:551.57

Gringorten, Irving I. (*Geophysics Res. Directorate, Air Force Cambridge Research Center, Mass.*) **An objective system for estimating fog and stratus probability at Randolph Field, Texas.** *American Meteorological Society, Bulletin*, 34(2):63–67, **1953.** 4 figs., 3 tables, 13 refs. **DWB**—In a competi tion between the Air Weather Service forecasting at Randolph Field and the objective forecasting personnel of the Geophysics Research Directorate at the Air Force Cambridge Research Center both terms averaged 78% accuracy in forecasting fog and stratus during the winter season of 1949–50 Average frequency of low ceilings, advancing maritime air, pressure gradient and mean dew point from 1939 to 1949 show a gradual rise, whereas there has been a similar fall in the frequency of polar outbreaks. An objective aid involves linear regression between days with on-shore pressure gradient and moisture over the Gulf of Mexico and probability of fog and stratus. A test of 13 years of data gives an expected number of accurate forecasts between 70% and 86% of total. (*Same item a* 5.1–86, Jan. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Objective forecasting 2. Fog forecastin 3. Stratus forecasting 4. Statistical forecasting 5. Randolph Field, Tex.**—*M.R.*

PART III. TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological and Geoastrophysical Abstracts.**

A. TRANSLATIONS OF IMPORTANT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

Faust, Heinrich: **The jet streams as a phenomena of the null layer.** (Transl. of the original German, **Die Strahlströme als Erscheinungen der Nullschicht,** in *Meteorologische Rundschau*, 7(9/10): 161–166, 1954. 5 figs., 3 tables, 23 refs.) Transl. by Valys Zilius and Rudolf Loeser issued by the American Meteorological Society under Contract AF 19(604)-1936, April 1959. 24 p. complete.

Istomin, V. G.: **Some results of the measurement of the spectrum mass of positive ions by the third artificial earth satellite.** (Transl. from original Russian, source unidentified). Transl. issued as *U. S. National Aeronautics and Space Administration, Technical Translation* F-7, April 1960. 19 p. 11 figs., 5 refs., eqs.

Kozyrev, N. A.: **Luminescence of the lunar surface and intensity of corpuscular radiation of the sun.** (Transl. of original Russian in *Simferopol', Crimea. Krymskaia Astrofizicheskaia Observatoriia, Izvestiia*, 16(148): 1956.) Transl. by F. Holden in *Astronomical News Letter*, Lille, France, No. 92:48–57, Feb. 20, 1959. DLC

Krasovskiĭ, V. I.: **Exploration of the upper atmosphere with the help of the third Soviet Sputnik.** (Transl. of the original Russian, **Issledovanie verkhneĭ atmosfery pri pomoshchi tret'ego iskusstvennogo sputnika Zemli,** in *Priroda*, Moscow, No. 12:71–78, Dec. 1958. 6 figs.) Transl. in *Institute of Radio Engineers, N. Y., Proceedings*, 47(2):289–296, Feb. 1959. 19 figs. (incl. photos) DLC. An English transl. also appeared in *International Astronautical Congress, Amsterdam, Aug. 1958, Proceedings*, Vol. 2:614–625, issued 1959. 9 figs., eqs. DLC (TL787.I44)

Kucherov, N. V. and Sternzat, M. S.: **Instruments for investigating the meteorological regime of the air layer near the ground.** (Transl. of original Russian, **Pribory dlia issledovaniia meteorologicheskogo rezhima v prizemnom sloe atmosfery,** in Leningrad. Glavnaia Geofizicheskaia Observatoriia, **Sovremennye problemy meteorologii prizemnogo sloia vozdukha.** Issued, Leningrad, 1958. p. 187–191. 23 refs.) Transl. into English by Nina Stepanova Zikeev issued by U. S. Weather Bureau, Jan. 1960. 9 p. Available DWB

Mastrup, Frithjof: **Experimental determination of the absolute oscillator strengths of the lines of two N II-supermultiplets.** (Transl. of the original German, **Eine experimentelle Bestimmung der absoluten Oszillatorenstärken der Linien zweier N II-Supermultipletts,** issued as a Ph.D. Thesis, Christian Albrechts University, Kiel, 1957.) Transl. by Consultants Custom Translations, Inc., N. Y., issued as *U. S. National Aeronautics and Space Administration, Technical Translation* F-38, May 1960. 19 p. figs., 11 tables, 15 refs., eqs.

B. RECENT MONOGRAPHS

Anderson, Brian: **Survey of soils in the Kongwa and Nachingwea Districts of Tanganyika.** Dept. of Agricultural Chemistry, Faculty of Agriculture and Horticulture, Univ. of Reading (England) in conjunction with Tanganyika Agricultural Corporation, 1957. 120 p. photos, figs. (some fold.), tables. Available DLC (S599.T25A7) Review by R. M. S. Perrin in *Nature*, London, 184(4703):1901, Dec. 19, 1959.

Bauer, Peter-Paul von: **Waldbau in Südchile** [Forests in southern Chile]. *Bonner Geographische Abhandlungen*, Bonn, No. 23, 1958. 120 p. figs., photos, tables, diags., refs. Available DWB (M(055)B716)

Borisov, A. A.: **Klimaty SSSR** [Climate of the U.S.S.R.]. Issued Moscow, Uchpedgiz., 1959. about 273 p. Review by A. M. Alpat'ev in *Meteorologiia i Gidrologiia*, No. 6:45–46, June 1960.

Debenham, Frank: **Antarctica: the story of a continent.** London, Herbert Jenkins, 1959. 264 p. photos. Available DLC (G870 1959.D4)

Dubief, Jean: **Le climat du Sahara, Vol. 1** [Climate of the Sahara, Vol. 1]. *Algiers. Universit Institut de Recherches Sahariennes, Mémoire* (hors série), 1959. 312 p. figs., charts, table bibliog. at end of each ch. Available DWB (M82/661.1 A396cL)

Duhem, Pierre: **Le système du monde: histoire des doctrines cosmologiques de Platon à Copernic Tome 10** [The system of the world: history of doctrines of cosmology from Plato to Copernicu Vol. 10]. Paris, Hermann, 1959. 528 p. Review by E. J. Dijksterhuis in *Nature*, Londo 184(4690):836, Sept. 1959.

Emery, Kenneth Orris: **Sea off Southern California: a modern habitat of petroleum.** N. Y., Joh Wiley, 1960. 366 p. figs., photos, tables, bibliog. p. 329–350. Available DLC (GC83.E

George, J. J. (ed.): **Weather forecasting for aeronautics.** With contributions by R. J. Shafe P. W. Funke; Biggers, W. R. et al. N. Y., Academic Press, 1960. 700 p. illus.

Gould, L. M.: **The polar regions in their relation to human affairs (Bowman Memorial Lecture No. 4** New York, American Geographic Society, 1958. 54 p. Price $3.50. Review in *Scotti Geographical Magazine*, 75(2):121, Sept. 1959.

Grieve, Hilda: **The great tide.** Chelmsford, Essex County Council, 1959. 883 p. figs., map (fold. Price 30s. Review in *Weather*, London, 15(10):335, Oct. 1959.

Hough, Jack L.: **Geology of the Great Lakes.** Urbana, Ill., Univ. of Illinois Press, 1958. 313 Price $8.50. Review by S. E. Hollingworth in *Nature*, London, 184(4687):665, Aug. 29, 195

International Ozone Conference, Chicago, Nov. 1956: **Ozone chemistry and technology: Proceedin of the Conference.** Wash., D. C., American Chemical Society, March 1959. 465 p. figs photos, tables, refs., eqs. Available DWB (M10.534.I614oz)

Klimaticheskii Atlas SSSR [Climatological Atlas of the U.S.S.R.]. Leningrad, Gidrometeoizda (1958?) Ed. by F. F. Davitaia. 7 p. 23 cm. At head of t-p.: Glavnoe Upravlenie Gidr meteorologicheskoĭ Sluzby pri Sovete Ministrov SSSR. Available DWB (M82.3/47 K65kt)

Landau, L. D. and Lifshitz, E. M.: **Statistical physics (Course of theoretical physics, Vol. 5).** Tran lated from the Russian by E. Peierls and R. F. Peierls. London, Pergamon Press, Ltd., 195 484 p. Price 80s net. Review by H. Steeple in *Nature*, London 184(4687):644–665, Au 29, 1959.

Menzel, Donald H.: **Our sun.** Rev. ed. Cambridge, Mass., Harvard Univ. Press, 1959. 350 figs., photos, tables. (*Harvard Books on Astronomy*, ed. by Harlow Shapley and Cecilia Payn Gaposchkin.) (*For abstract on 1950 ed., see* 3.10–279, Oct. 1952, *Met. Abstracts*)

Patton, C. P.: **Climatology of summer fogs in the San Francisco Bay area.** *California Uni Univ. of California Publications in Geography*, 10(3), 1956. 88 p. figs. Price $2.00. Revie by F. Steinhauser in *Archiv f. Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 9(2):307 30 1958.

Putnam, William C. et al.: **Natural coastal environments of the world.** Los Angeles, 1960. 140 figs., tables, maps (in pocket).

Rajewsky, Boris et al.: **Strahlendosis und Strahlenwirkung: Tafeln und Erläuterungen, Unterlage für den Strahlenschutz** [Radiation dose and radiation effect; tables and explanations, da for use in radiation protection]. 2d ed. enl. and rev. Stuttgart, G. Thieme, 1956. 84 Available DLC (QH652.R33 1956)

Sverdrup, Otto Neumann: **Sverdrup's Arctic adventures.** (Adapted from [his] **New land: fo years in the Arctic regions,** and ed. with additional chapters by T. C. Fairley.) Londo Longmans, 1959. 305 p. photos, maps, bibliog. Available DLC (G670 1898.S93)

Wolfrom, Melville L. and Tipson, R. Stuart (eds.): **Advances in carbohydrate chemistry, Vol. 1.** New York, Academic Press, Inc., 1958. 387 p. Review by Alfred Gottschalk in *Natur* London, 184(4687):662–663, Aug. 29, 1959.

Yeomans, P. A.: **The challenge of landscape: the development and practice of Keyline.** Sydne Australia, Keyline Pub., 1958. 271 p. figs., plates. Available DLC (S471.A82N48) Revie in *Scottish Geographical Magazine*, Edinburgh, 75(3):185, Dec. 1959.

Zeuner, Frederick Eberhard: **The pleistocene period: its climate, chronology and faunal succession** London, Hutchinson, 1959. 447 p. figs., tables, bibliog. Available DLC (QE696.Z4 195 Review by Jean Tricart in *Scottish Geographical Magazine*, Edinburgh, 75(3):175–178, De 1959.

C. ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Acta Hydrophysica, Berlin, Vol. 6, No. 2, 1960

Schellenberger, Günter: **Betrachtungen zur Seeretention,** [Notes on lake retention], p. 65–7

Griesseier, Helmut: **Über die Entwicklung und den gegenwärtigen Stand der Küstenforschun in der Deutschen Demokratischen Republik,** [Development and present status of coast studies in the German Democratic Republic], p. 73–96

Kühlmann, Dietrich H. H.: **Wasserführung und Eisverhältnisse zweier Kleingewässer,** [Water flow and ice conditions of two ponds], p. 97–126

American Meteorological Society, Bulletin, Vol. 41, No. 6, June 1960

Conover, John H. and Sadler, James C.: **Cloud patterns as seen from altitudes of 250 to 850 miles: preliminary results,** p. 291–297
Lackey, Earl E.: **A method for assessing hourly temperature probabilities from limited weather records,** p. 298–303
Jehn, K. H.: **Microwave refractive index distributions associated with the Texas-Gulf cyclone,** p. 304–312
Ives, Ronald L.: **Audio systems for radio-range station weather receivers,** p. 313–316
Jenrette, James P.: **An objective application of vorticity principles to precipitation forecasting,** p. 317–323
Vilho Väsälä's 70th anniversary, p. 336

Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A, Vienna, Vol. 11, No. 4, 1960

Pichler, H. and Reuter, H.: **Zur graphischen Integration der Wirbelgleichung mit Berücksichtigung orographischer Effekte,** [Graphical integration of the vorticity equation, taking into account the effect of orography], p. 413–426
Steinhauser, F.: **Statistische Untersuchung der Inversionen im Luftraum über Wien,** [Statistical study of inversions over Vienna], p. 427–457
Staley, R. C.: **Some observations of water vapor fluctuations in a stable atmosphere over a lake surface,** p. 458–464
Hofmann, G.: **Wärmestrom, Massenstrom und Volumstrom,** [Heat flux, mass flux and volume flux], p. 465–473
Hofmann, G.: **Wärmehaushalt und Advektion,** [Thermal economy and advection], p. 474–502
Schulz, W.: **Untersuchungen über das Wachstum der Eiskristalle,** [Investigations on the growth of ice crystals], p. 503–531

Astronomische Nachrichten, Berlin, Vol. 285, No. 4, March 1960

Scheffler, H.: **Strahlenoptische Ausbreitung in Medien mit statistisch verteilten Inhomogeneitäten, Pt. 3, Strahlenverlauf und Intensitätsschwankungen als Markoff-Prozess,** [The propagation of optical radiation in a medium with random inhomogeneities, Pt. 3, Radiation regime and intensity variations considered as a Markoff process], p. 153–160
Rudolph, R.: **Beobachtungsergebnisse der Berliner Arbeitsgemeinschaft für Veränderliche Sterne** (BAV), [Results of observations by the Berlin study group of variable stars], p. 161–169
Künzel, H.: **Statistische Untersuchungen über Häufigkeit, Zonenwanderung und Lebensdauer von Sonnenflecken im 18. Aktivitätszyklus,** [Statistical studies of the frequencies, zonal displacement and lifetime of sunspots during the 18th activity cycle], p. 169–173
Pauscher, H.: **Drei Messreihen zur Bestimmung des Venusdurchmessers,** [Three series of measurements to determine the diameter of Venus], p. 174–180
Bronkalla, W.: **Die Periodenänderungen von 27 Veränderlichen des Kugelhaufens M 15,** [Changes in the periods of 27 variable stars in the globular cluster Messief 15], p. 181–190
Bohrmann, A.: **Ein Sternpaar mit gemeinsamer Eigenbewegung,** [Joint relative motion of a pair of stars], p. 190
Ahnert, P.: **Untersuchung über die Doppelsternnatur der Nova DQ Herculis vor dem Ausbruch,** [A study of the double-star quality of Nova DQ Herculis before the eruption], p. 191–195
Ahnert, P.: **Sternbedeckungen durch den Mond 1958 und 1959,** [Occultations of stars by the Moon in 1958 and 1959], p. 196
Vorausberechnete Sternbedeckungen durch den Mond 1960, [Predicted occultations of stars by the moon for 1960], p. 197–198
Kopff, A.: [**Obituary of**] **Werner Schaub,** p. 199–200

Australian Meteorological Magazine, Melbourne, No. 26, Sept. 1959

Kraus, E. B.: **Numerical trial forecasts of precipitation in the Snowy Mountains of Australia,** p. 1–17
Australia. Bureau of Meteorology: **Tropical depressions in the northwestern Australian region during the 1957–1958 season, by the Forecasting Section, Divisional Office, Perth,** p. 18–29

Australia. Bureau of Meteorology: **Tropical depressions in the northwestern Australian regi during the 1958–1959 season, by the Forecasting Section, Divisional Office, Perth,** p. 30–
Australia. Bureau of Meteorology: **Occurrence of tropical depressions and cyclones in t northeastern Australian region during the season 1958–1959, by Forecasting Sectio Divisional Office, Brisbane,** p. 50–75
Phillips, E. F.: **The association of sferics with tropical cyclones,** p. 76–85
Kraus, E. B.: **The reduction of humidity observations,** p. 86–89
Berson, F. A.: **On the vorticity theorem,** p. 90–95
Rankin, D. W.: **Mortality associated with heat wave conditions in the Melbourne metropolit area, January and February 1959,** p. 96–98
Reber, Grote: **Atmospheric pressure oscillations atop Haleakala,** p. 99–103

Beiträge zur Geophysik, Leipzig, Vol. 68, No. 5, 1959

Arnold, Kurt: **Zur strengen Theorie der Figur der Erde,** [A rigorous theory of the shape of t earth], p. 257–262
Olberg, Manfred: **Das Verhalten der Krümmungsradien der Äquipotentialflächen und de jenigen ihrer orthogonalen Trajektorien an Diskontinuitätsflächen der Dichte,** [T behavior of curvature radii of equipotential surfaces and of their orthogonal trajectories discontinuity surfaces of density], p. 263–267
Jung, Karl: **Zur gravimetrischen Bestimmung der Bodendichte,** [Gravimetric determinati of soil density], p. 268–279
Burkard, Otto: **Die Häufigkeit plötzlicher Sturmanfänge (S.S.C.s) in Abhängigkeit von d Weltzeit,** [The frequency of sudden storm commencements in relation to world time p. 280–282
Fanselau, G. and Zander, W.: **Vorläufiger Bericht über die Beobachtungen am Adolf-Schmid Observatorium für Erdmagnetismus in Niemegk in der Zeit vom 1. September bis 3 Dezember 1958,** [Preliminary report on observations at the Adolf-Schmidt Geomagnet Observatory in Niemegk from Sept. 1–Dec. 31, 1958], p. 283–288
Svoboda, Karel: **Berechnung der magnetischen Deklination in der ČSR,** [Computation magnetic declination in Czechoslovakia], p. 289–294
Porstendorfer, Gottfried: **Direkte Aufzeichnungen tellurischer Vektordiagramme und ih Anwendungen in Bergbaugebieten,** [Direct records of telluric vector diagrams and the application in mining districts], p. 295–307
Dietze, Gerhard: **Eine Methode zur Bestimmung der atmosphärischen Lichtextinktion a Aktinometermessungen,** [A method of determining atmospheric light extinction fro actinometer measurements], p. 308–314

Vol. 68, No. 6, 1959

Schmelovsky, K. H.; Klinker, Ludwig and Knuth, R.: **Über die Electronen-konzentration der äusseren Ionosphäre nach Untersuchungen des Faraday-Fadings am Satelliten 1958δ²** [Electron concentration in the upper atmosphere from investigations of the Faraday-fadin of 1958δ² satellite], p. 321–341
Loewe, Fritz and Radok, Uwe: **On the annual cycle in the sunspot numbers,** p. 342–353
Fanselau, G. and Zander, W.: **Vorläufiger Bericht über die Beobachtungen am Adolf-Schmid Observatorium für Erdmagnetismus in Niemegk in der Zeit vom 1. Januar bis 30. Ap 1959,** [Provisional report on observations at the Adolf-Schmidt Geomagnetic Observato in Niemegk, Jan. 1–April 30, 1959], p. 354–359
Båth, Marcus: **Seismic channel waves: new observations and discussions,** p. 360–376
Ertel, Hans: **Estructura cinemática de la capa superficial en olas marinas,** [Kinematic structu of the surface layer of ocean waves], p. 377–381

Beiträge zur Physik der Atmosphäre, Frankfurt a.M., Vol. 32, No. 3/4, 1960

[Obituary of] **Ernst Kleinschmidt, 1877–1959,** p. 132–134
van Mieghem, Jacques: **Le principe variationnel de la mécanique de l'atmosphère,** [The vari tion principle in the mechanics of the atmosphere], p. 135–152
Dufour, L.: **Sur une extension de la notion de température thermodynamique du thermomèt mouillé,** [Extension of the concept of thermodynamic temperature of the wet bulb the mometer], p. 153–157
Zierep, Jürgen: **Zur Theorie der Zellularkonvektion IV, Über die Bewegungsrichtung in therm konvektiven Zellularströmungen,** [Theory of cellular convection, Pt. 4, Direction of moti in thermal convective cellular flow], p. 158–160

Hollmann, Günther: **Der mikroturbulente Vertikalaustausch von Masse und Wärme; ein Beitrag zur Lösung des Wärmeaustausch-Paradoxons von W. Schmidt,** [Small-scale turbulent vertical mass and temperature exchange; a contribution to solving the heat exchange paradox of W. Schmidt], p. 161–194

Hübner, Christiane and Wippermann, Fritz: **Tests der Konvergenzgeschwindigkeit eines dreidimensionalen Relaxationsverfahrens zur Ermittlung des Feldes der Vertikalgeschwindigkeit in der Atmosphäre,** [Tests of the convergence velocity of a three-dimensional relaxation method to determine the vertical velocity field of the atmosphere], p. 195–201

Rao, K. N.: **Difference between wet-bulb temperature (T_w) and pseudo-wet-bulb temperature T_{sw},** p. 202–214

Sinha, M. C.: **Upper air standing waves over Kabul Valley,** p. 215–236

Hopper, V. D. and Laby, Jean E.: **High altitude studies with meteorological balloons,** p. 237–248

Fortak, H.: **Gradientwindbestimmung aus Karten in stereographischer Projektion,** [Determination of gradient winds from charts in a stereographic projection], p. 249–256

Raethjen, P.: **Über den "Scale"—Unterschied vertikaler und horizontaler Störbewegungen,** [Scale differences between vertical and horizontal motion of perturbations], p. 257–264

Danielsen, N. E. F. and Reiter, E. R.: **[Comment on] E. Kleinschmidt: Nichtadiabatische Abkühlung im Bereich des Jet-Stream,** [Comments on E. Kleinschmidt's adiabatic cooling in the jet stream region], p. 265–273

Vassy, Arlette: **Un nouvel ozonomètre enregistreur,** [A new ozone recorder], p. 277–282

Frankenberger, E.: **Über den Vertikalaustausch,** [Vertical exchange], p. 283–299

Canadian Journal of Physics, Ottawa, Vol. 38, No. 6, June 1960

Forsyth, P. S.; Green, F. D. and Mah, W.: **The distribution of radio-aurora in central Canada,** p. 770–778

Herzberg, Luise: **The wavelength displacements of some infrared lines between limb and center of the sun, Pt. 2,** p. 853–865

Ryan, W. D. and Harrower, G. A.: **An apparent solar periodicity in radio star scintillation,** p. 883

Vol. 38, No. 7, July 1960

van Heerden, I. J. and Judek, B.: **The relative abundances of cosmic ray nuclei of charge $Z \geqslant 3$,** p. 964–967

Geofisica e Meteorologia, Genoa, Vol. 8, No. 1/2, Jan./April 1960

Dinelli, L. M.: **L'eliminazione della componente elettrosmotica inversa nei processi EGO,** [Elimination of the inverse electro-osmotic component from electrogeo-osmotic processes], p. 1–4

[Obituary on] Francesco Signore (1886–1959), p. 4

[Obituary on] Hellmut Berg (1908–1960), p. 4

Patella, L. V.: **I precedenti europei ed italiani sui nuovi metodi di prospezione geofisica "Overvoltage,"** [New methods of high voltage geophysical prospecting and previous European and Italian studies], p. 5–9

Primault, Bernard: **Nouveaux essais de lutte contre le gel au moyen de coiffes individuelles,** [Recent experiments of frost control by means of individual screens], p. 11–15

Primault, Bernard: **Des répercussions d'enveloppes de plastique sur le microclimat de la vigne,** [The effect of plastic screens on the microclimate of vines], p. 16–22

[Obituary on] Karl Schneider-Carius (1896–1959), p. 22

Bossolasco, Mario and Dagnino, Ignazio: **Ricerche di fisica marina, 2, Cinematica delle correnti superficiali costiere,** [Research in physical oceanography, Pt. 2, Kinematics of coastal surface currents], p. 23–32

Geophysical Magazine, Tokyo, Vol. 29, No. 4, March 1960

Miura, T.: **Influence function $F_n(t)$ of electromagnetic seismograph: its introduction and properties with applications,** p. 465–475

Kizawa, Takashi: **Some new phases observed in a study of earthquake swarms relating to volcanic activity, Pt. 1,** p. 477–498

Utsu, T.: **Observations of the L_g waves and crustal structure in the vicinity of Japan,** p. 499–508

Kawabata, Y.: **On the sufficient number of rainfall stations for small basins,** p. 509–512

Nakada, Y.: **A method of analysing periodic or cyclic variations and some examples,** p. 513–526

Horiuchi, Goji: **Remarks on the nitric oxide in the mesosphere,** p. 527–530
Horiuchi, Goji: **A possible interpretation on the meridional distribution of atmospheric ozone** p. 531–534
Gambo, K.: **Geostrophic approximation related to the scale effect of atmospheric disturbances** p. 535–556
Endo, H.: **On the thermal excitation of solar semidiurnal tide of the earth's atmosphere,** p. 557–569
Kawabata, Y.: **Observation of atmospheric diffusion at Tokai-mura,** p. 571–582
Nagao, T.: **Turbulence theory of singularities, Pt. 2,** p. 583–632

Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere and Space Research in Japan, Vol. 13, No. 1, 1959 (Entire issue devoted to proceedings of its Symposium on the Movement of the Non-uniform Ionized Gas in the Magnetic Field, Dec. 19, 1959)

Maeda, Ken-ichi: **Opening discussion,** p. 1–3
Matuura, Nobuo: **Some remarks on motion of ionospheric irregularity,** p. 4–20
Shimazaki, Tatsuo: **World-wide measurements of horizontal ionospheric drifts,** p. 21–47
Tsukamoto, Kenichi and Ogata, Yoshiharu: **Ionospheric drifts at Yamagawa in Japan,** p. 48–55
Tsuda, Takao: **Motion of irregularities in the ionosphere,** p. 56–61
Kato, Susumu: **Ionized irregularities and wind motion in the ionosphere,** p. 62–78
Maeda, Hiroshi: **Horizontal winds and ionization drifts in the ionosphere,** p. 79–90

Journal of Geophysical Research, Wash., D. C., Vol. 65, No. 6, June 1960

Roberts, Walter Orr and Zirin, Harold: **Recent progress in solar physics,** p. 1645–1659
Field, George B.: **The source of radiation from Jupiter at decimeter wavelengths, Pt. 2, Cyclotron radiation by trapped electrons,** p. 1661–1671
Wyatt, P. J.: **Induction drag on a large negatively charged satellite moving in a magnetic-field-free ionosphere,** p. 1673–1678
Brown, Harrison: **The density and mass distribution of meteoritic bodies in the neighborhood of the earth's orbit,** p. 1679–1683
Bauer, Siegfried J.: **Inferred temperature variations at the F_2 peak,** p. 1685–1690
Dueño, Braulio: **Peculiarities and seasonal variations of transequatorial backscatter echoes as observed at Mayagüez, Puerto Rico,** p. 1691–1698
Stoffregen, W.; Derblom, H. and Omholt, A.: **Some characteristics of the D-region ionization during auroral activity,** p. 1699–1704
Ellis, G. R. A.: **Geomagnetic disturbances and 5 kilocycles per second electromagnetic radiation** p. 1705–1710
Lockhart, L. B., Jr.; Baus, R. A.; Patterson, R. L., Jr. and Saunders, A. W. Jr.: **Radiochemical analyses of fission debris in the air along the 80th meridian, west,** p. 1711–1722
Lund, Iver A.: **A method for estimating conditional probabilities,** p. 1723–1729
Kao, S.-K: **Stationary flow in the planetary boundary layer with an inversion layer and a sea breeze,** p. 1731–1736
Hershfield, D. M. and Kohler, M. A.: **An empirical appraisal of the Gumbel extreme-value procedure,** p. 1737–1746
Meyer, Adolph F.: **Effect of temperature on ground-water levels,** p. 1747–1752
Nelson, R. William: **In-place measurement of permeability in heterogeneous media, Pt. I Theory of a proposed method,** p. 1753–1758
Hurwitz, L. and Nelson, J. H.: **Proton vector magnetometer,** p. 1759–1765
Cook, John C.: **RF electrical properties of salty ice and frozen earth,** p. 1767–1771
Brace, W. F.: **Behavior of rock salt, limestone, and anhydrite during indentation,** p. 1773–178
Thomas, Charles W.: **Late Pleistocene and recent limits of the Ross Ice Shelf,** p. 1789–179
Båth, Markus: **Crustal structure of Iceland,** p. 1793–1807
Shurbet, D. H.: **The P phase transmitted by crustal rock to intermediate distances,** p. 1809–181
Nanda, J. N.: **The origin of microseisms,** p. 1815–1820
Lincoln, J. Virginia: **Geomagnetic and solar data,** p. 1821–1823
Mawdsley, J.: **Movement of auroral ionization,** p. 1825–1827
Mawdsley, J. and Ward, W. H.: **Field-aligned ionization,** p. 1828–1830
Chubb, T. A.; Friedman, H. and Kreplin, R. W.: **Measurements made of high-energy X rays accompanying three class 2+ solar flares,** p. 1831–1832
Campbell, Wallace H.: **Magnetic micropulsations, pulsating aurora, and ionospheric absorption** p. 1833–1834

Barrett, Alan H.: **Microwave absorption and emission in the atmosphere of Venus**, p. 1835–1838
Helliwell, R. A. and Bell, T. F.: **A new mechanism for accelerating electrons in the outer ionosphere**, p. 1839–1842
Campbell, Wallace H.: **Concerning the nature of short-period magnetic micropulsations**, p. 1843–1845
Gallagher, P. B. and Eshelman, V. R.: **'Sporadic shower' properties of very small meteors**, p. 1846–1847
Daniels, Fred B.; Bauer, Siegfried J. and Harris, Arthur K.: **Vertically traveling shock waves in the ionosphere**, p. 1848–1850
Salpeter, E. E.: **Scattering of radio waves by electrons above the ionosphere**, p. 1851–1852
Bowles, K. L.; Cohen, R.; Ochs, G. R. and Balsley, B. B.: **Radio echoes from field-aligned ionization above the magnetic equator and their resemblance to auroral echoes**, p. 1853–1855
Coleman, P. J., Jr.; Sonett, C. P.; Judge, D. L. and Smith, E. J.: **Some preliminary results of the Pioneer V magnetometer experiment**, p. 1856–1857
Smith, E. J.; Coleman, P. J.; Judge, D. L. and Sonett, C. P.: **Characteristics of the extraterrestrial current system Explorer VI and Pioneer V**, p. 1858–1861
Fan, C. Y.; Meyer, P. and Simpson, J. A.: **Preliminary results from the space probe Pioneer V**, p. 1862–1863

Journal of Meteorological Research, Tokyo, Vol. 11, No. 3, March 1959

Yamada, S.: **A synoptic study on the mesoscale instability lines associated with severe local storms**, p. 155–168
Kikuchi, S.: **Researches on the sea surface temperature of the East China Sea, Pt. 1, Characters on the normal conditions**, p. 169–183
Shimada, K.: **Some discussions on the path of typhoon 5811 Alice determined by the reconnaissance flight data**, p. 184–189
Yoshida, S.: **Measurement of micro-tremor of the ground in the neighbourhood of Hachinohe thermal power station**, p. 190–194
Maeda, I. and Katō, H.: **An objective method of forecasting precipitation**, p. 195–205
Ozaki, K.: **Estimation of maximum hourly precipitation from daily precipitation**, p. 206–208
Yamashita, H. and Sumino, M.: **Forecasting of rainfall amount by cold front associated with upper high-latitude trough, taking the basin of river Kitakami as a model**, p. 209–217
Uemura, H.: **On the relation between the monthly mean solar radiant energy from the whole sky on a horizontal surface and the cloud amount, Pt. 1**, p. 218–225
Masatsuka, A.; Kubo, S. and Arai, S.: **Some statistical studies on precipitation in the central region of Japan, Pt. 1**, p. 226–235
Suzuki, H.: **On the wind waves along Echizen coast, Pt. 1**, p. 236–240
Shinohara, T.: **The error coming from counting fractions of 0.5 and disregarding the rest smaller in air temperature observation**, p. 241–242
Nagao, T.: **The variation of normal**, p. 243–244
Hirose, M.: [**Comments on**] **K. Akedo: Pressure pattern accompanied by confluence and its modifications, and** [**Reply by**] **Akedo**, p. 245–246

Vol. 11, No. 4, April 1959

Neyama, Y.: **The long-range forecast of typhoon by upper air data at Marcus Island**, p. 247–261
Suzuki, E.: **Statistical study on the amount of precipitation, Pt. 10, Geographical distributions of the total amount of precipitation caused by each typhoon in the western part of Japan**, p. 262–268
Frolow, Vladimir: **On the annual components computed with the normal monthly values of precipitation and temperature in Japan**, p. 269–272
Tomitaka, S.: **A statistical investigation on the wind in the lower atmosphere in Fukuoka Prefecture**, p. 273–278
Sugaya, S. (comp.): **On the ending of Bai-u of 1957 from the viewpoint of 5-day mean 500 mb chart**, p. 280–334
Hiyama, K. (comp.): **Investigation on the forecasting of the ending of Bai-u**, p. 335–357
Yagi, H.: **Forecasting the period of heavy rainfall in Bai-u season**, p. 358–362
Nakamura, K.: **A note on "Kujira no Shippo," Pt. 1, A type of pressure distribution over Japan in summer season**, p. 363–365
Sasaki, R.: [**Comments on**] **T. Rikitake: The pressure disturbance, Pt. 1,** and [**Reply by**] **Rikitake**, p. 366–367

Vol. 11, No. 5, May 1959

Takaya, S.: **On the relation between climate and the June dropping of peach fruits,** p. 369–37
Kita, I. and Aya, T.: **Observation of the scattering of saline drops near the seashore inland b strong wind,** p. 373–376
Hashimoto, Y. and Mukai, S.: **On the mode of rainfall at Takamatsu,** p. 377–380
Tsukamoto, K.; Takahashi, K.; Tsuneoka, S. and Mitsudera, M.: **Studies on meteorologica instruments for agricultural use, Pt. 3, Automatic control system for soil moisture,** p. 381 386
Kubo, J.: **Normal heating degree days,** p. 387–390
Makino, K.: **On the probability of the last frost day in Aichi Prefecture,** p. 391–394
Daigo, Y. and Takaya, S.: **Distribution of indoor sensible temperature in Japan,** p. 395–40
Japan. Meteorological Agency: **A phenological investigation of the flowering of cherry blossom (prunus yedoensis Matsum.) in 1958,** p. 401–403
Kubo, J.: **Bibliography on industrial meteorology and urban climate (1957),** p. 404–407
Kamiyama, K. and Iesaka, T.: **Study on the economical estimation of agrometeorologica disasters, Pt. 1,** p. 408–424
Kusakabe, M.: **A historical aspect of the natural disasters in Kyūshū and Yamaguchi Prefecture** p. 425–465
Hiramitsu, H.: **Meteorological disasters in Gifu Prefecture,** p. 466–467

Vol. 11, No. 6, June 1959

Fukuhara, K.: **On the types of weather situations over West Japan in winter,** p. 469–474
Aoki, K. and Miura, S.: **On the local heavy rainfall over Southwestern part of Hokkaidō o April 21, 1958,** p. 475–483
Suzuki, E. and Sunagawa, A.: **Statistical study on the amount of precipitation, Pt. 11, The typ of geographical rainfall distribution caused by typhoon and discriminant functions,** p. 484 490
Uwai, K.: **Development of tropical disturbance (On atmospheric disturbance in low latitudes Pt. 5),** p. 491–501
Tomioka, S.: **Drought in Hokuriku District during Bai-u season in 1958,** p. 502–506
Yoshida, S.: **Determination of the catching ratio of snow in various types of snow gauge an examination for the practical use of totalizer (Study on totalizer, Pt. 2),** p. 507–524
Okuyama, K. and Unoki, S.: **General description of storm tides on the coasts of Japan,** p. 525 536
Murayama, N.: **An estimation of the date of nuclear explosion test from the attenuation o artificial atmospheric radioactivity,** p. 537–542
Toyama, Y.: **An analysis of gust over the Japan sea on April 14, 1957,** p. 543–548
Yakushima, Japan. Weather Station: **On the rainfall and wind caused by typhoons in Yak ushima, Pt. 1,** p. 549–552
Murakami, T.: **The general circulation and water-vapor balance over the Far East during th rainy season,** p. 553–554
Nemoto, J.: **[Comment on] S. Tanabe: an interpretation of the similarity of typhoon to hurri cane in formation and path, and [Reply by] Tanabe,** p. 555–558
Yajima, Y.: **[Comments on] S. Watanabe: some improvements of microbarograph, an [Reply by] Watanabe,** p. 559–560

Journal of Meteorology, Boston, Vol. 17, No. 3, June 1960

Higuchi, Keiji: **On the coalescence between plane snow crystals,** p. 239–243
Atlas, David: **Radar detection of the sea breeze,** p. 244–258
Rosenthal, Stanley L.: **Some estimates of the power spectra of large-scale disturbances in lo latitudes,** p. 259–263
Jehn, K. H.: **The use of potential refractive index in synoptic-scale meteorology,** p. 264–26
Hitschfeld, Walter: **The motion and erosion of convective storms in severe vertical wind shear** p. 270–282
Greenfield, S. M. and Kellogg, W. W.: **Calculations of atmospheric infrared radiation as see from a meteorological satellite,** p. 283–290
Abraham, Farid F.: **Determination of long-wave atmospheric radiation,** p. 291–295
Smith, Lawrence B.: **The measurement of winds between 100,000 and 300,000 ft by use o chaff rockets,** p. 296–310
Aagard, Roger L.: **Measurements of infrared radiation divergence in the atmosphere with th double-radiometer and the black ball,** p. 311–318

McDonald, James E.: **Direct absorption of solar radiation by atmospheric water vapor,** p. 319–328
Boville, B. W.: **The Aleutian stratospheric anticyclone,** p. 329–336
Jordan, C. L.; Hurt, David A., Jr. and Lowrey, Clifford A.: **On the structure of hurricane Daisy on August 27, 1958,** p. 337–348
Keily, D. P. and Millen, S. G.: **An airborne cloud-drop-size distribution meter,** p. 349-356
Kasahara, Akira: **The numerical prediction of hurricane movement with a two-level baroclinic model,** p. 357–370
Rathbun, E. R.: **An electromagnetic basis for the initiation of a tornado,** p. 371–373
Friedlander, S. K.: **On the particle-size spectrum of atmospheric aerosols,** p. 373–374
Ramage, C. S.: **[Comment on] Emanuel M. Ballenzweig: Relation of long-period circulation anomalies and tropical storms and [Reply by] Ballenzweig,** p. 375–376
Jenkinson, A. F.: **[Comment on] E. G. Bowen: The relation between rainfall and meteor showers and [Reply by] Bowen,** p. 376–377
Duquet, Robert T.: **An analytic expression for the modification of cold air by a warm surface,** p. 377
Lettau, Heinz: **[Comment on] L. F. Hubert: Distribution of surface friction in hurricanes and [Reply by] Hubert,** p. 378–379
Levert, C.: **Further remarks concerning his: Limits to certainty,** p. 379–380
McDonald, James E.: **[Comment on] R. R. Rapp: Rates of descent of fallout particles from thermonuclear explosions and [Reply by] Rapp,** p. 380–382

Marine Observer, London, Vol. 30, No. 188, April 1960

Tunnell, G. A.: **The pattern of the general atmospheric circulation,** p. 72–85
Waterman, J. J. and Cutting, C. L.: **Weather and the fishing industry,** p. 85–90
Tunnell, G. A.: **Notes on ice conditions in areas adjacent to the North Atlantic Ocean,** p. 90–95
Observations from auxiliary ships in South African waters during the I.G.Y., p. 95 96
New Meteorological Office headquarters building at Bracknell, p. 96–97

Meteorological Magazine, London, Vol. 89, No. 1,054, May 1960

Sutton, Sir Oliver Graham: **Gassiot Fellowships in Geophysics,** p. 129–130
Lowndes, C. A. S.: **The forecasting of dry spells of three days or more at London and in south-east England in May to October,** p. 131–145
Harley, D. G.: **Frontal contour analysis of a "polar" low,** p. 146–147
Hooper, A. H.: **Recording equipment for the British radio-sonde,** p. 147–150
Tinney, E. B.: **Rate of visibility deterioration in fog at Merryfield, and the time of fog dispersal,** p. 150–156
Murray, R.: **Mean 200-millibar winds at Aden in January 1958,** p. 156–157

Meteorologiia i Gidrologiia, Moscow, No. 4, April 1960

Davitaia, F. F.; Drozdov, O. A. and Rubinshteĭn, E. S.: **Klimaticheskie resursy i perspektivy ikh ispol'zovaniia v narodnom khoziaĭstve,** [Climatic resources and a perspective of their use in the national economy], p. 3–9
Kogan-Beletskiĭ, G. I.: **Otsenka usloviĭ poleta na bol'shoĭ vysote,** [Evaluation of high level flight conditions], p. 10–16
Velikanov, M. A.: **Stokhasticheskaia struktura gidrologicheskogo prognoza i uchet ego oshibok,** [Stochastic structure of a hydrological forecast and estimate of errors], p. 17–24
Baranov, A. M.: **O vertikal'noĭ protiazhennosti oblakov verkhnego iarusa,** [Vertical extent of high level clouds], p. 25–26
Zamorskiĭ, A. D.: **Sverkhperistye oblaka,** [Ultra-cirrus clouds], p. 26–28
Doroshenko, F. T.: **O prichinakh vozniknovseniia shkvalov,** [Causes of squall formation], p. 28–31
Zubenko, F. S. and Trepettsov, E. V.: **Primenenie aerofotos"emki dlia izucheniia pereformirovaniia beregov vodokhranilishch,** [Utilization of aerial photographic surveys for the study of the changes in the shape of reservoirs], p. 31–34
Sokolov, I. N.: **K voprosu o koeffitsiente soprotivleniia na nizhneĭ poverkhnosti ledianogo pokrova,** [Problem of the resistant coefficient at the lower surface of an ice cover,] p. 34 -36

Tsomaia, V. Sh. and Kisin, I. M.: **Nekotorye itogi issledovaniia poverkhnostnogo taianiia lednikov Kavkaza,** [Some results of a study on the surface melting of the Caucasus glaciers], p. 36–38

Volkov, P. A.: **O perenose zhidkosti pri rasprostranenii poverkhnostnykh voln,** [Transfer of liquid in the presence of surface waves], p. 38–41

Bushtruk, P. S.: **Opyt raboty gidrometeorologicheskogo biuro Poltava,** [Experience gained from work of the Poltava Hydrometeorological Bureau], p. 42–45

Kireev, V. D. and Drakin, V. P.: **Prisposoblenie dlia zimnikh gidrometricheskikh rabot,** [A device for winter hydrometric work], p. 45–46

Furs, M. I.: **O nastennykh kodakh,** [Wall charts of codes], p. 46

Pikazin, Ia. S. and Rybakov, E. T.: **Aliumosilikolevyi sposob polucheniia vodoroda,** [Aluminum silicol method of hydrogen production], p. 47–48

Ikonnikova, L. N.: **K voprosu ob izmerenii skorosti vetra fliugerom,** [Problem of wind velocity measurement by means of vanes], p. 48–50

Nikandrov, V. Ia.: **Bor'ba protiv gradobitiĭ v Italii,** [Fight against damage done by hail in Italy], p. 51–52

Popova, K. I.: **Pervaia monografiia o klimate Rossii,** [First monograph on the climate of Russia], p. 53–55

Literatura po meteorologii, gidrologii i okeanografii za 1959 god, [Literature on meteorology hydrology and oceanography in 1959], p. 56–60

Somov, N. V.: **Pervoe nauchno-tekhnicheskoe soveshchanie po gidrometeorologicheskomu obsluzhivaniiu stroitel'stva i ekspluatatsii gidroelektrostantsiĭ,** [The first scientific technical conference on hydrometeorological service for construction and exploitation of hydroelectric power stations], p. 61–62

Monthly Weather Review, Wash., D. C., Vol. 88, No. 2, Feb. 1960

Wexler, H.; Moreland, W. B. and Weyant, W. S.: **A preliminary report on ozone observations at Little America, Antarctica,** p. 43–54

Wiin-Nielsen, A.: **On changes in zonal momentum in short-range numerical prediction,** p. 55–63

Sneyers, Raymond: **On a special distribution of maximum values,** p. 66–69

von Eschen, G. F.: **Nighttime temperature rises in mountain canyons,** p. 70–71

Stark, L. P.: **The weather and circulation of Feb. 1960: a cold stormy month over the United States associated with widespread blocking,** p. 72–78

Vol. 88, No. 3, March 1960

Fritz, S. and Wexler, H.: **Cloud pictures from satellite TIROS I,** p. 79–87

Niemeyer, Lawrence E.: **Forecasting air pollution potential,** p. 88–96

House, D. C.: **Remarks on the optimum spacing of upper-air observations,** p. 97–100

Dightman, R. A.: **Comparison of evaporation from Weather Bureau Class A and Bureau of Plant Industry (BPI) sunken pans, Fort Assinniboine, Montana,** p. 101–106

Rush, Rue E.: **Two unique eastern Pacific hurricanes of 1957,** p. 107–111

Dunn, Carlos R.: **The weather and circulation of March 1960: a cold, snowy month,** p. 112–120

Nagoya. Univ. Research Institute of Atmospherics, Proceedings, Vol. 7, Jan. 1960

Takeuti, T.; Ishikawa, H. and Takagi, M.: **On the cloud discharge preceding the first ground stroke,** p. 1–6

Sao, Kazuo: **Researches in the frequency analyses of waveforms of atmospherics, Pt. 2,** p. 7–1

Nakai, Taketosi: **The study of the amplitude probability distributions of atmospheric radio noise,** p. 12–27

Kamada, Tetsuo: **Statistical properties of the sudden enhancement of atmospherics in V.L.F range,** p. 28–39

Kimpara, Atsushi: **On some remarkable characteristics on whistler atmospherics,** p. 40–57

Outsu, J.: **Numerical study of tweeks based on waveguide mode theory,** p. 58–71

Tanaka, Haruo and Kakinuma, Takakiyo: **Sudden disappearance of a source of S component of solar radio emission at microwave frequencies on Nov. 30, 1959,** p. 72–78

Tanaka, Haruo and Kakinuma, Takakiyo: **Preliminary results of observations of the source of slowly varying component with two interferometers at 9400 and 4000 Mc/s,** p. 79–88

Kimpara, Atsushi: **Sea phenomena due to nuclear explosion,** p. 89–91

Iwai, Akira: **Mobile observing station for studying the error of CRDF,** p. 92

Iwai, Akira: **On a wide band CRDF for atmospherics,** p. 93

Tateno, Japan. Aerological Observatory, Journal, Vol. 6, No. 4, Jan. 1960

Kitaoka, Tatsumi: **Short period oscillation of atmosphere near tropopause,** p. 169–180
Sumi, T.: **The time variations of upper air pressure, temperature, dewpoint temperature and wind velocity,** p. 180–189
Ikeda, H.: **On the correlation between the total amount of ozone and the other meteorological elements at Tateno,** p. 191–203
Yamasaki, M. and Akita, T.: **Observation of the vertical distribution of ozone by airborne spectrographs, Pt. 4,** p. 205–207
Kitaoka, Tatsumi: **Special upper air observations at solar eclipse on Sept. 12, 1950, Appendix,** p. 111–171

U. S. National Bureau of Standards, Journal of Research, Sec. D, Vol. 64, No. 4, July/Aug. 1960

Wheelon, Albert D.: **Relation of turbulence theory to ionospheric forward scatter propagation experiments,** p. 301–309
Blevis, B. C. and Chapman, J. H.: **Characteristics of 488 megacycles per second radio signals reflected from the moon,** p. 331–334
Little, C. Gordon and Lawrence, Robert S.: **The use of polarization fading of satellite signals to study the electron content and irregularities in the ionosphere,** p. 335–346
Wright, J. W. and Gautier, T. N.: **Note on a test of the equivalence theorem for sporadic E propagation,** p. 347–348
Taylor, W. L.: **Daytime attenuation rates in the very low frequency band using atmospherics,** p. 349–355
Watt, A. D. and Maxwell, E. L.: **Measured electrical properties of snow and glacial ice,** p. 357–363
Pierce, E. T.: **Some ELF phenomena,** p. 383–386
Wait, James R.: **Mode theory and the propagation of ELF radio waves,** p. 387–404
Garland, G. D. and Webster, T. F.: **Studies of natural electric and magnetic fields,** p. 405–408
Campbell, Wallace H.: **Natural electromagnetic energy below the ELF range,** p. 409–411
Balser, M. and Wagner, C. A.: **Measurements of the spectrum of radio noise from 50 to 100 cycles per second,** p. 415–418

Weather, London, Vol. 15, No. 6, June 1960

Johnson, A. I.: **The summer of 1959,** p. 185–196
Smith, David J.: **Altostratus on a cold front,** p. 198–203
Chandler, T. J.: **Wind as a factor of urban temperatures: a survey in north-east London,** p. 204–213

Weatherwise, Boston, Vol. 13, No. 3, June 1960

Hawkins, Harry F.: **The hurricane beacon,** p. 91–93
Buckmaster, A. T.; Albers, H. W.; Ballenzweig, E. M. and Miller, J. F.: **Weather routing of ships by the U. S. Navy,** p. 94–98
Williams, Dansy T.: **The National Severe Local Storms Research Project,** p. 99–100; 131
Ludlum, David M.: **The weather at Gettysburg,** p. 101–105; 130
Riley, J. A.; Kish, A. J. and Measells, J. W.: **Mississippi Delta agricultural weather project: a Weather Bureau pilot project,** p. 106–109
McDonald, James E.: **The ice-fall problem,** p. 110–114; 132
Stewart, John W.: **Atmospheric phenomena at a sunrise total solar eclipse,** p. 115–117
The weather past, July and August, p. 118–119

Wetter und Leben, Vienna, Vol. 11, No. 8/10, 1959

Eckel, O.: **[Obituary of] Dr. Franz Sauberer,** p. 119–124
Knapp, R.: **Einfluss von Spätfrösten auf verschiedene Pflanzen-Arten in Wäldern und auf Schlagflächen,** [The influence of late frosts on various plant species in forests and clear-cut areas], p. 125–130
van Eimern, J.: **Erfahrungen bei der Messung der Benetzungsdauer von Blättern für pflanzenpathologische Zwecke,** [Measurements of the duration of moisture on leaves for purposes of plant pathology], p. 131–138

Fischer, P. Leander: **Der winterliche Strassenzustand 1958/59 in Wien I, Schottengasse und Helferstorferstrasse,** [The winter street conditions 1958/1959 in Vienna I, Schottengasse and Helferdorferstrasse], p. 139–142
Roller, Maria: **Phänologische Wanderungen als Hilfsmittel der Klimakunde,** [Phenological excursions as an aid to climatology], p. 143–149
Lauscher, F.: **Über die alten und neuen Kälte-Rekorde,** [Old and recent records of cold], p. 150

Vol. 11, No. 11/12, 1959

Undt, W.: **Probleme und Ergebnisse der Medizin-Meteorologie,** [Problems and results of medical meteorology], p. 167–173
Die Entdeckung der Kosmischen Strahlung in Wien 1911–1912, [The discovery of cosmic radiation in Vienna 1911–1912], p. 174
Pühringer, A.: **Fortschritte in der Erforschung der Kosmischen Strahlung seit dem Ende des zweiten Weltkrieges,** [Progress in the exploration of cosmic rays since the end of the Second World War], p. 175–182

Vol. 12, No. 1/2, 1960

Härtel, Otto: **Zur Auswertung von Windrichtungsregistrierungen bei Rauchschadenuntersuchungen,** [Evaluation of wind direction records for smoke damage investigations], p. 1–5
Fliri, Franz: **Zur Methodik der dynamischen Klimakunde in den Ostalpen,** [Methodology of dynamic climatology applied to the Eastern Alps], p. 6–14
Dirmhirn, Inge: **Ein einfacher Empfänger zur Messung der Chlorophyllabsorption,** [A simple element for measurement of chlorophyll absorption], p. 15–19
Steinhauser, F.: **Erstes Symposium über die Meteorologie und Klimatologie der Karpaten,** [First symposium on the meteorology and climatology of the Carpathians], p. 20–22
Lauscher, F.: **Probleme der Chemie der Luft, des Bodens und der Pflanzen,** [Problems of chemistry of the air, of the ground and of plants], p. 23–25
Lauscher, F.: [**Obituary of**] **Dr. Ernst Kleinschmidt,** p. 26
Lauscher, F.: [**Obituary of**] **Dr. Karl Schneider-Carius,** p. 26

Vol. 12, No. 3/4, 1960

Sauberer, Franz: **Über Feldmessungen mit Interferenzfilter-Monochromatoren im infraroten Spektralbereich,** [Field measurements using interference filter monochromators in the infrared spectral range], p. 47–52
Kletter, Leopold: **Die meteorologischen Ursachen der Hochwasserereignisse im Sommer 1959,** [Meteorological causes of floods in the summer of 1959], p. 53–62
Eckel, O.: **Zur Kontrolle und Bearbeitung der Bodentemperaturmessungen,** [Control and analysis of soil temperature measurements], p. 63–69
Dolezal, Erich: **Winterkälte in Noricum,** [Winter cold in Noricum], p. 70–71
Müller, Walter: **Methoden zur Abschätzung der Anteile bestimmter Bewölkungsstufen aus den drei Klimaterminen,** [Methods for estimating the frequencies of specified cloud amounts on the basis of three standard observations], p. 72–76
Lauscher, F.: [**Obituary of**] **Hellmut Philipp Berg,** p. 77–78
Eckel, O.: **Anleitung für Beobachtung der Bodentemperatur,** [A guide to soil temperature observation], p. 82–84

Vol. 12, No. 5/6, 1960

Wurzer, Rudolf: **Zur Geschichte der Raumplanung in Österreich,** [History of city planning in Austria], p. 95–98
Lauscher, Friedrich: **Der CVP-Index: ein Versuch der Klassifikation der Erdklimate auf Grund der forstlichen Produktivität,** [The CVP-Index: attempt at the classification of world climate on the basis of forest productivity], p. 98–103
Müller, Walter: **Zur Bestimmung der täglichen Verdunstung mit Hilfe verschiedener Verdunstungsmesser,** [Calculation of daily evaporation by means of various evaporimeters], p. 103–109
Lauscher, Friedrich: **Bericht über agrarmeteorologische Untersuchungen einer norwegischen Gebirgsstation,** [Report on agrometeorological research at Norwegian mountain stations] p. 110–113

Stelzer, Franz: **Die Bodenbewegungen im Winter 1959/60,** [Soil movement in the winter of 1959/60], p. 114–118

Undt, W.: **Deutscher und Österreichischer Kongress für Balneologie, medizinische Klimatologie und physikalische Medizin,** [German and Austrian Congress for balneology, medical climatology and physical medicine], p. 118–124

Chalupa, K.: **Bericht über die Staubtagung in Wien vom 4.–6. Mai 1960,** [Report of the Conference on Dust in Vienna, May 4–6, 1960], p. 125–126

Lauscher, Friedrich: **Spät- und Frühfröste am Alpenostrand (Burgenland),** [Late and early frost on the east side of the Alps (Burgenland)], p. 129–133

Zeitschrift für Meteorologie, Berlin, Vol. 13, No. 9/10, Sept./Oct. 1959

Skeib, G.: [**Obituary of**] **Dr. Fritz Schindelhauer,** p. 201–204

Dahler, H.: **Die Bedeutung der Temperaturadvektion für die Bildung und Verlagerung von Strahlstrom und Tropopause,** [The effects of advective temperature changes on the formation and displacement of the jet stream and the tropopause], p. 205–211

Heckert, Lothar: **Die klimatischen Verhältnisse in Laubwäldern,** [Climatic conditions in deciduous forests], p. 211–223

Teich, M.: **Fernbindungen zwischen Temperaturanomalien nach den Pentadenwerten für Potsdam,** [Distant connection between temperature anomalies according to the pentad values for Potsdam], p. 224–232

Teich, M.: **Wahrscheinlichkeitsvorhersagen über monatliche Temperaturanomalien für Potsdam auf Grund der Erhaltungs- und Wiederholungsneigung vorangegangener Temperaturpentadenanomalien,** [Probability forecasts of monthly temperature anomalies for Potsdam, based on the conservation and recurrence tendencies of preceding anomalies], p. 232–237

Marquardt, W.: **Ergebnisse der Radioaktivitätsmessungen in Dresden-Wahnsdorf,** [Measurements of radioactivity in Dresden-Wahnsdorf], p. 237–248

Böhme, Wolfgang: **Über die Struktur der zeitlichen Verteilung ähnlicher meteorologischer Entwicklungen und Möglichkeiten zur prognostischen Verwendung dieser Struktur,** [Time distribution patterns of similar meteorological developments and possible uses of such patterns in forecasting], p. 249–250

PART IV. AUTHOR AND SUBJECT INDEXES

In this section will be found reference to the number given at the head of each abstract or entry. In Part I each entry begins with the number 11.7, and in Part II in the Bibliography on Forecast Verification each entry begins with the number and letter 11G. This index is divided into three parts:

Index of Authors — Index of Subjects — Index of Geographical Locations

INDEX OF AUTHORS

Abbot, C. G., 11.7–56
Ackley, C. (*ed.*), 11.7–19
Advances in Astronautical Sciences, 11.7–167
Air Conditioning, Heating and Ventilating, 11.7–288
Akademiia Nauk SSSR, 11.7–35, 11.7–36, 11.7–317, 11.7–368, 11.7–369
Alciatore, H. F., 11G–9
Aleksandrov, V. S., 11.7–253
Allen, R. A., 11G–53
Alt, J., 11.7–306
Ambrózy, P., 11G–180
American Astronautical Society, 11.7–167
American Geophysical Union, 11.7–39
American Meteorological Society, Bulletin, 11.7–59
American Meteorological Society, D. C. Branch, 11G–70
Advances in Agronomy, 11.7–6
Anderson, D. L., 11.7–196
Andreev, I. D., 11.7–232
Angenheister, G., 11.7–162
Appleman, H. S., 11G–191
Arakawa, H., 11.7–282, 11.7–362
Arbey, F., 11.7–186
Arléry, R., 11G–165
Armstrong, T., 11.7–30
Artamonov, A. A., 11G–138
Aubert, E. J., 11G–51
Aujeszky, L., 11G–139
Austin, J. M., 11.7–327
Australian Journal of Science, 11.7–165
Avsiuk, G. A., 11.7–36

Bachmann, H., 11.7–124
Bagge, E., 11.7–133
Bagrov, N. A., 11G–115
Bailey, H. P., 11.7–377
Bandorina, A. K., 11G–20
Barabashov, N. P., 11.7–122
Barbé, G., 11.7–324
Barg, B., 11.7–387
Barklie, R. H. D., 11.7–340
Barnes Engineering Co., 11.7–252
Barnes, J. L., 11.7–169
Barsukov, N. A., 11.7–192
Baumbach, S., 11.7–60
Baur, F., 11G–47
Becker, F., 11.7–103
Belgian Congo Service Météorologique, 11.7–17
Bell, Barbara, 11.7–123
Beloborodova, G. G., 11.7–86
Belon, A. E., 11.7–141
Benashvili, I. A., 11.7–185, 11G–18
Berg, M. R., 11.7–144
Bergen, C. (*transl.*), 11.7–49
Berggren, R., 11G–149, 11G–166, 11G–167, 11G–181
Bergthórsson, P., 11G–116
Berkner, L. V., 11.7–171
Berson, F. A., 11.7–287
Berzon, I. S., 11.7–398
Bessemoulin, J., 11G–86
Betin, V. V., 11.7–197
Beynon, W. J. G. (*ed.*), 11.7–139
Bibron, R., 11.7–292
Biel, E. R., 11.7–380
Biesel, F., 11.7–181
Bigg, E. K., 11.7–269
Bilham, E. G., 11G–13
Binder, O., 11.7–133
Blache, J., 11.7–1
Blackmer, R. H., Jr., 11.7–264
Bleeker, W., 11G–31
Blot, C., 11G–42
Bohnert, L. M., 11.7–69
Bolin, B., 11G–52
Bolotinskaia, M. Sh., 11G–117
Bonasera, F., 11G–87
Borgman, L. E., 11G–182
Braham, R. R., 11.7–397
Brater, E. F., 11.7–206
Brier, G., 11G–26, 11G–27, 11G–43, 11G–53, 11G–70, 11G–134, 11G–175
Bristor, C. L., 11G–54
Briunelli, B. E., 11.7–152
Brodovitskiĭ, K. V., 11G–44
Brogmus, W., 11.7–110
Broĭdo, A. G., 11.7–296, 11.7–297
Bromberg, S., 11G–75
Brook, M., 11.7–397
Brooke, Cl., 11.7–112
Brooks, C. F., 11G–45
Brown, H. A., 11.7–240
Browne, Irene M., 11.7–200
Bruch, A., 11G–75
Bruun, A. F., 11.7–190
Bryan, W. W., 11.7–373
Bugaev, V. A., 11.7–75
Bukhnikashvili, A. V., 11.7–47
Bulletin de Géophysique, 11.7–242
Bushby, F. H., 11G–88
Businger, J. A., 11.7–259, 11.7–301
Buswell, A. M., 11.7–264
Byers, H. R., 11G–22

Čadež, M., 11.7–299
Calif. Inst. of Tech., 11G–35
Cantone, B., 11.7–113
Capot-Rey, R., 11.7–318
Cate, J. L. (*ed.*), 11.7–55
Černava, Sáva, 11G–168
Chalmers, J. A., 11.7–396
Chalupa, V., 11.7–95
Chaplygine, A. S., 11G–150
Charney, J., 11G–52
Chatelet, J. (*transl.*), 11.7–118
Chemekov, Iu. F., 11.7–223
Chicago Univ. Dept. of Met., 11.7–240, 11G–75, 11G–103, 11G–141, 11G–188
Chicago Univ. Weather Forecasting Research Center, 11G–140

Chivers, H. J. A., 11.7–163, 11.7–164
Chudnovskiĭ, A. F., 11G–32
Clark, K. C., 11.7–141
Clayton, H. H., 11G–4, 11G–14, 11G–17
Coaldrake, J. E., 11.7–373
Codd, A. R., 11.7–221
Collings, G. H., 11.7–386
Colon, J. A., 11.7–281
Contract AF W28-099 ac-430, 11G–35
Contract AF 19(122)-447, 11G–67
Contract AF 19(122)-468, 11G–105
Contract AF 19(122)-642, 11.7–149
Contract AF 19(604)-1141, 11.7–33
Contract AF 19(604)-1293, 11G–141
Contract AF 19(604)-1384, 11.7–259, 11.7–301, 11.7–331
Contract AF 19(604)-1738, 11.7–157
Contract AF 19(604)-2065, 11.7–340
Contract AF 19(604)-2179, 11G–188
Contract AF 19(604)-2450, 11G–185
Contract AF 19(604)-3063, 11.7–337
Contract AF 19(604)-3065, 11G–187
Contract AF 19(604)-4692, 11.7–123
Contract DA-36-039-Sc-64656, 11.7–264
Contract DA-36-039-Sc-73186, 11.7–229
Contract DA-36-039-Sc-78901, 11.7–240
Contract DA-36-039-Sc-78091, 11.7–310
Contract DA-36-039-Sc-78127, 11.7–314
Contract Noa(s) 57-636-c, 11.7–252
Contract N189 (188)-34785A, 11.7–326
Contract Nonr 551(07), 11G–125
Contract N6ori-02036, 11G–75
Contract N189s-86996, 11G–99
Contract N189s-92545, 11G–106
Contract W-28-099-ac-398, 11G–48
Contract W-36-039-Sc-32286, 11.7–397
Conversi, M., 11.7–137
Cook, U. C., Jr., 11.7–386
Cooke, W. E., 11G–8
Coppens, R., 11.7–117
Corby, G. A., 11G–71
Coroli, R., 11.7–44
Cottam, W. P., 11.7–93
Countryman, C. M., 11.7–100
Craven, W. F. (*ed.*), 11.7–55
Cressman, G. P., 11G–76
Crossan, T. R., 11G–102
Crossley, A. F., 11G–72, 11G–89
Cry, G. W., 11.7–283

Dane, M. (*transl.*), 11.7–31
Danjon, A. (*ed.*), 11.7–1
Davidson, B., 11.7–302, 11.7–314
Davitaia, F. F. (*ed.*), 11.7–45
De Bernochi, C., 11.7–341
De Boer, J., 11.7–8
Decker, F. B., 11.7–229
Defant, F., 11G–75
de Lisle, J. F., 11G–118
De'Munari, G. M., 11.7–137
Deymié, Ph., 11.7–209
D'iachkova, T. V., 11.7–236
Diamond, M., 11.7–343
Diaz, E. L., 11G–73
Di Caporiacco, G., 11.7–361
Dickison, R. B. B., 11.7–72
Diehl, H., 11G–155
Dinies, E., 11G–155
Dobrynin, B. F., 11.7–13
Döös, B. R., 11G–116
Dolphin, L. T., 11.7–144
Dooge, J. C. I., 11.7–54
Douglas, R. H., 11.7–340
Douglass, J. E., 11.7–365
Dralkin, A. G., 11.7–31
Drewes, W. J., 11G–189
Driving, A. Ia., 11.7–393
Drobnick, R., 11.7–93
Dufour, L., 11.7–22
Durst, C. S., 11G–169, 11G–183
Dussert-Bergerac, A., 11.7–271
Duvedal, T., 11G–151
Dyce, R. B., 11.7–144
Dynametrics Corporation, 11.7–254
Dzhordzhio, V. A., 11.7–75

Easley, J. W., 11.7–235
Eastern Air Lines, Inc., 11G–105
Egedal, J., 11.7–154
Egidi, A., 11.7–137
Eldridge, A. C., 11G–104
El-Fandy, M., 11.7–272
Elford, G. R., 11.7–23
Elliott, W. P., 11.7–330
Ellsaesser, H. W., 11G–152
Emslie, J. H., 11G–184
Encyclopedie Francaise, 11.7–1
Erinç, S., 11.7–7
Ernst, L. F., 11.7–207
Essenwanger, O., 11.7–325
Estoque, M. A., 11G–141, 11G–160
Eventov, I. M., 11.7–5
Evgenov, N. I., 11.7–182
Evjen, S., 11G–119

Farquharson, J. S., 11G–153
Fateev, E. M., 11.7–10
Faust, H., 11G–90
Fawbush, E. J., 11G–55, 11G–91
Fedoseev, A. P., 11.7–86, 11.7–87
Fel'dman, IA. I., 11.7–352
Fiorini, E., 11.7–137
Fiskin, J. M., 11.7–233
Fjørtoft, R., 11G–95
Foitzik, L., 11.7–390
Fontaine, P., 11.7–210
Ford, D. C., 11.7–224
Ford, P. M., 11G–92
Forst, A. L., 11G–93
Franken, E., 11G–120
Franklin, H. J., 11G–10
Fryklund, S., 11G–116
Fujita, Tetsuya, 11.7–240
Fulmer, A. L., 11.7–229

Gabilly, A., 11G–142
Galin, M. B., 11.7–273
Galligan, A. M., 11G–147
Gal'perin, I. A., 11.7–348
Gandin, L. S., 11G–121
Garber, T. B., 11.7–172
Garret, C. C., 11G–11
Garrigue, H., 11.7–114
Gazikalovič, V., 11.7–217
Gazley, C., Jr., 11.7–173
George, J. J., 11G–23, 11G–105
Ghirshman, R., 11.7–4
Gibson, H. M., 11.7–264
Gleeson, T. A., 11G–154
Gödecke, K., 11.7–60
Götz, G., 11G–180
Godson, W. L., 11.7–33
Goĭsa, N. I., 11.7–251
Gokhale, N. R., 11.7–340
Goldschmidt, N., 11.7–208
Gopal Rao, S., 11G–107
Gorelov, S. K., 11.7–177
Gorshenin, K. P., 11.7–2
Green, S. W., 11G–170
Greenhow, J. S., 11.7–163, 11.7–304
Gringorten, I. I., 11G–56, 11G–70, 11G–122, 11G–123, 11G–124
Groening, H. U., 11.7–328
Groves, G. V., 11.7–129
Guigay, G., 11.7–293
Guilhot, R., 11.7–364

Guillot, P., 11.7–211
Gulick, Y. R., 11G–75

Haggard, W. H., 11.7–283, 11G–100
Hale, D. P., 11.7–142
Hallenbeck, C., 11G–41
Halliday, I., 11.7–147
Hansen, R. T., 11.7–158, 11.7 159
Harrell, J. H., 11.7–397
Harrington, M. W., 11G–5
Harris, C. W., 11.7–397
Harrison, H. T., 11G–57
Harty, J., 11.7–397
Harvard Univ. Observatory, Solar Dept., 11.7–123
Hašek, M., 11G–143
Hatakeyama, H., 11.7–307
Haug, O., 11G–116
Haurwitz, B., 11.7–310
Hawkins, G. S., 11.7–161
Hay, J. S., 11.7–276
Hazen, H. A., 11G–6
Heath-Smith, J. R., 11.7–74
Heidke, P., 11G–19
Herdman, H. F. P., 11.7–201
Hess, P., 11G–155
Heyden, F. J., 11.7–121
Hill, E. L., 11.7–76
Hilst, G. R., 11.7–323
Hinds, M. K., 11G–88
Hinze, J. O., 11.7–277
Hoecker, W. H., Jr., 11.7–286
Hofman, A., 11G–36, 11G–74, 11G–155, 11G–156
Hoffschmidt, R., 11.7–289
Holden, F. R., (*ed.*), 11.7–19
Holleyman, J. B., 11.7–264
Hollgren, G., 11.7–127
Holloway, J. L., Jr., 11G–125
Hoover, R. A., 11G–46
Hoover, R. M., 11.7–399
Hopmans, J. J., 11.7–207
Hopp, L. E., 11G–189
Hoppe, W., 11.7–138
Hornstein, R. A., 11.7–52, 11G–111
Hudson, J. P., (*ed.*), 11.7–42
Hütter, U., 11.7–111
Hughes, L. A., 11G–160
Hughes, L. A., (*ed.*), 11G–75
Huisman, L., 11.7–207
Hunsucker, R. D., 11.7–229
Hunter, M. W., 11.7–170

Iakovlev, V. I., 11.7–248
Illinois State Water Survey, Met. Lab., at Illinois Univ., 11.7–264
Imuta, S., 11.7–218
Inoue, E., 11.7–295
International Civil Aviation Organization, 11G–94
International Council of Scientific Unions, 11.7–139
IGY, 11.7–35
Ďordanov, D., 11.7–305
Iorish, A. L., 11.7–104
Israël, H., 11.7–241
Israel Hydrological Service, 11.7–208
Italy. Ispettorato Telecomunicazioni e Assistenza del Volo, 11G–66
Iudin, M. I., 11.7–335
Ivanov, K. E., 11.7–215
Ivanov, N. N., 11.7–12
Ives, R. L., 11.7–391
Izvestiia, 11.7–31

Jacquet, J., 11.7–212
Jagannathan, P., 11G–107
James, J. C., 11.7–132
Jansky, K., 11.7–20
Japan Meteorological Agency, 11.7–307
Jenkins, C. F., 11G–185
Jensen, K., 11G–95
Joensen, P. H., 11.7–32
Johannessen, K. P., 11G–76
Johnson, D. H., 11G–183
Jones, D. L., 11G–99, 11G–106
Jones, L., 11.7–300
Jones, R. A., 11G–63
Jordan, C. L., 11.7–250, 11.7–354
Jorgensen, D. L., 11G–126, 11G–127
Josephson, J., 11.7–280
Journal of Scientific and Industrial Research, 11.7–175
Julian, P. R., 11.7–326
Junge, C. E., 11.7–268
Juul, J., 11.7–109

Kadoya, K., 11G–58
Kargol, F. M., 11.7–332
Karman, I., 11.7–257
Kasuya, M., 11G–157
Katsnelson, J., 11.7–350
Katsuragi, Y., 11.7–116
Kay, R. H., 11.7–105
Keary, T. J., 11.7–37
Keegan, T. J., 11.7–33
Kensche, H., 11.7–80
Kern, H., 11.7–97
Kersnovskiĭ, B., 11G–2
Khmaladze, G. N., 11.7–358
Khabrov, Iu. B., 11G–158
Kiess, C. C., 11.7–121
Kiess, Harriett, K., 11.7–221
Kiss, Á., 11.7–379
Kitaĭgorodskiĭ, S. A., 11.7–278
Kitano, Kiyomitsu, 11.7–195
Klevelsberg, R., 11.7–225
Klenova, M., 11.7–31
Kletter, L., 11G–144
Knepple, R., 11.7–291
Ko, H. C., 11.7–166
Koelmeyer, K. O., 11.7–96
Koloskov, P. I., 11.7–374 11.7–381
Kondrat'ev, K. Ia., 11.7–275
Konecci, E. B., 11.7–170
Kononovich, E. V., 11.7–125
Koo, Chen-chao, 11G–159
Kopáček, J., 11G–145
Kopal, Z., 11.7–120
Kopanev, I. D., 11.7–319
Kopcewicz, T., 11.7–115
Korn, G. A., 11.7–3
Korn, Theresa M., 11.7–3
Kornilov, N. A., 11.7–130
Korotkevich, E. S., 11.7–202
Koshinskiĭ, S. D., 11.7–388
Kozhar, S. L., 11.7–297
Kraght, P. E., 11G–59
Krawitz, L., 11.7–326
Kriss, A. E., 11.7–191
Kroening, J. L., 11.7–249
Kronberg, N., 11.7–386
Kronig, R. de L., 11.7–8
Krueger, A. H., 11.7–264
Krŭstanov, L., 11.7–305
Krzywoblocki, M. Z. V., 11.7 279
Kuboš, M., 11G–168
Kubota, K., 11G–60
Kucherov, N. V., 11.7–237
Kuhnke, W., 11.7–101
Kuo, W. S., 11.7–266
Kurbatkin, G. P., 11.7–274
Kusano, K., 11G–171

Laĭkhtman, D. L., 11.7–38
La Mer, V. K., 11.7–338
La Nature, 11.7–245
Landa, M., 11.7–375
Lang, C., 11G–1
Langenberg, J., 11.7–103
Lappe, U. O., 11.7–302
Large, E. C., 11G–96
Large, M. I., 11.7–394
Lassettre, E. N., 11.7–149
Latour, J. H. M., 11.7–207
Leadabrand, R. L., 11.7–144
Ledneva, K. V., 11.7–335
Leight, W. G., 11G–37, 11G 38, 11G–77, 11G–97
Lepotier, R., 11.7–198
Lesage, G., 11.7–284
Les Ailes, 11.7–79
Levert, C., 11.7–261
Lichikaki, V. M., 11.7–8 11G–128
Lillard, J. H., 11.7–355
Lindquist, H. D., 11G–129
Lindquist, R., 11G–116
Liutershteĭn, I. G., 11G–32
Lo, Szu-wei, 11.7–308
Lönnqvist, O., 11G–78

Loeser, G., 11G–47
Loewe, F., 11.7–66
Lona, F., 11.7–384
London, J., 11.7–157
Loti, P., 11.7–22
Lowell, H., 11.7–77
Lugeon, J., 11.7–258
Lund, I. A., 11G–124
Luxembourg Service Météorologique et Hydrographique, 11.7–243

McCabe, J. T., 11.7–309
McDonald, J. E., 11.7–226
McGill Univ. Arctic Met. Research Group, 11.7–33
McGill Univ. Macdonald Physics Lab. Stormy Weather Research Group, 11.7–340
McKinley, D. W. R., 11.7–131
McNamara, A. G., 11.7–131
Magill, P. L., (*ed.*), 11.7–19
Maine, R., 11G–130
Malville, J. M., 11.7–143
Manneback, C., 11.7–65
Markov, K. K., 11.7–36
Martin, D. E., 11G–146
Massachusetts Institute of Technology, 11G–48, 11G–67
Masson, D. J., 11.7–173
Matano, H., 11G–172
Mateo Gonzales, P., 11.7–370
Maull, O., 11.7–178
Means, L. L., 11G–93
Meeker, R. I., Jr., 11G–79
Meeks, M. L., 11.7–132
Meetham, A. R., 11G–34
Meixner, F., 11.7–315
Melpar Inc., 11G–185
Metcalfe, J. W., 11.7–69
Meteorologiia i Gidrologiia, 11.7–63
Meteorological Society of Japan, 11.7–62
Metz, L. J., 11.7–365
Michelet, J., 11.7–22
Michna, E., 11.7–349
Miller, D. H., 11.7–363
Miller, M. A., 11G–124
Miller, R. C., 11G–55, 11G–91
Milone, F., 11.7–11
Minnis, C. M., 11G–98
Mirkin, S. L., 11.7–320
Mironova, Z. F., 11.7–236
Mitra, A. P., 11.7–25
Miyake, Y., 11.7–116
Mizon, E. A., 11G–173
Molchanov, L. A., 11.7–64
Mook, C. P., 11G–70
Moreland, W. B., 11.7–29
Morgan, D. A., 11G–80
Morgans, J. F. C., 11.7–193
Morlet, M., 11.7–57
Morskoi, G. N., 11G–115
Morton, B. R., 11.7–303
Moyer, V. E., 11G–99, 11G–106
Müller, Th., 11.7–106
Mukherjee, Asoke Kumar, 11.7–357
Muller, R. H., 11G–28
Munk, W. H., 11.7–183
Munn, R. E., 11G–111, 11G–131
Mysels, Karol J., 11.7–339

Nakahara, N., 11.7–307
Namias, J., 11G–30, 11G–174
Nature, 11.7–27
Naturwissenschaftliche Rundschau, 11.7–128
Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, 11.7–207
Neill, H., 11.7–397
Neill, J. C., 11.7–264
Neuberger, H. H., 11.7–49, 11G–99
Neufeld, E. L., 11.7–304
Neurath, Marie, 11.7–24
New Mexico. Institute of Mining and Technology, 11.7–397
New York Univ. College of Engineering, Research Div. Dept. of Met. and Oceanog., 11.7–157, 11.7–310, 11.7–314
Newman, J. E., 11.7–92
Newman, M. M., 11.7–76
Newton, C. W., 11.7–333
Newton, Harriet R., 11.7–333
Nickola, P. W., 11.7–323
Nikiforova, A. T., 11.7–85
Nikol'skiĭ, S. I., 11.7–135
Nilakantan, P., 11.7–322
Nolan, P. J., 11.7–342
Norman, A. G., (*ed.*), 11.7–6
Norquest, K. S., 11G–75, 11G–82
Notess, C. B., 11.7–302
Nottingham, England. Univ. Easter School of Agricultural Science, 11.7–42
Nyberg, A., 11.7–58

Obenland, E., 11.7–316
Obmiński, Z., 11.7–94
Observatories' Yearbook, 11.7–244
O'Carroll, F. M., 11G–132
Ochs, R., 11.7–90
Oertel, A. G., 11G–81
Ogneva, T. A., 11.7–40
Ohio State Univ. Research Foundation, 11.7–149
Okami, Noboru, 11.7–189
Olbers, W., 11.7–60
Omoto, Y., 11.7–240
Omshanskiĭ, M. A., 11G–24
Ono, Nobuo, 11.7–199
Oregon. State College, Corvallis, 11.7–229
Oshiba, Gohachiro, 11.7–189
Otto, W. M., 11.7–366

Pagava, S. T., 11G–33
Palmer, T. Y., 11G–68
Palosuo, E., 11.7–203
Palson, W. C., 11G–137
Panenka, I., 11.7–238
Panofsky, H. A., 11.7–301, 11.7–326, 11.7–331, 11G–175
Pappalardo, G., 11.7–113
Paramonov, N. A., 11.7–230
Parczewski, N., 11.7–334
Pardé, M., 11.7–213
Parker, E. N., 11.7–134
Parovshchikov, V. Ia., 11.7–88
Pascal, J., 11.7–117
Pasquill, F., 11.7–276
Paz Soldán, C. E., 11.7–372
Pechala, F., 11G–168
Ped', D. A., 11.7–265
Penman, H. L., 11.7–42
Pennsylvania Univ. Institute for Cooperative Research, 11G–125
Penna. State Univ. Mineral Industries Exp. Sta. Dept. of Met., 11.7–326, 11G–99, 11G–106
Perers, O., 11.7–127
Petersen, G. A., 11G–186
Peterson, L., 11.7–146
Petrasovits, I., 11.7–382
Petri, Winfried, 11.7–174
Petrosiants, M. A., 11.7–75
Petterssen, S., 11.7–48, 11G–76, 11G–160
Pfau, R., 11.7–353
Pfeiffer, J., 11.7–20
Pierrehumbert, C., 11G–130
Pike, J. M., 11.7–229
Poggi, A., 11.7–359
Pomanskiĭ, A. A., 11.7–135
Popov, L. I., 11.7–26
Portela, C., 11.7–210
Potter, T. D., 11.7–309
Poulter, R. M., 11.7–347
Priroda, 11.7–145
Probatov, A., 11.7–192
Proctor, I., 11.7–21
Project AROWA (TED-UNL-MA-501.12), 11G–100
Project AROWA (TED-UNL-MA-501.19), 11.7–14
Project DA-3199-07-022, 11.7–397
Pruvost, P., 11.7–1

Purvis, J. C., 11.7–386
Putz, R. R., 11.7–184
Pshenichnyĭ, A. Ia., 11.7–64
Pykhtunova, V. M., 11.7–371

Raethjen, P., 11.7–329
Raman, Sir C. V., 11.7–392
Ramdas, L. A., 11G–107
Rand Corp., 11.7–70
Rao, S. G., 11G–15
Rastogi, R. G., 11.7–140
Ratcliffe, J. A., 11.7–41
Ratti, S., 11.7–137
Reber, G., 11.7–20
Reed, R. J., 11.7–33, 11G–187
Reeder, H. O., 11.7–219
Rees, M. H., 11.7–148
Reid, D. G., 11.7–287
Reiquam, H., 11.7–343
Reuter, H., 11G–161
Revue de Pathologie Générale, 11.7–270
Reynolds, S. E., 11.7–397
Rhodesia Agricultural Journal, 11.7–246
Rhodesia & Nyasaland Meteorological Service, 11.7–78
Ricamo, R., 11.7–113
Richard, F., 11.7–216
Riehl, H., 11G–75, 11G–82, 11G–100
Rieker, Jean, 11.7–258
Rigby, M., 11.7–68
Rikitake, T., 11.7–151
Robb, J. D., 11.7–76
Roberts, C. A., 11.7–233
Rockney, V. D., 11.7–263
Rodenwaldt, E., 11.7–108
Romania Directia Generala Hidrometeorologica, 11.7–220
Romanov, N. N., 11.7–64, 11.7–75
Rossi, V., 11.7–262
Rossing, H. C., 11.7–336
Roubault, M., 11.7–117
Rouch, J., 11.7–179
Routledge, N. A., 11.7–28
Roy, M., 11.7–168
Rubbia, C. V., 11.7–137
Ruche, J., 11.7–247
Rudomanski, A. C., 11.7–252
Ruff, I., 11.7–157
Russak, S. L., 11.7–235

Sagalyn, R. C., 11.7–395
Saint-Girons, H., 11.7–385
Saint-Girons, M. C., 11.7–385
Salamonik, S., 11.7–239
Sandritter, W., 11.7–103
Sapozhnikova, S. A., 11.7–84
Sarazhskiĭ, D. Ia., 11.7–256
Sartor, E. E., 11.7–260
Sartor, J. D., 11G–37, 11G–38
Saruhashi, K., 11.7–116
Sasaki, T., 11.7–189
Saucier, W. J., 11G–176
Sauer, E. G. F., 11.7–81
Saunders, W. E., 11F–71
Savur, S. R., 11G–15
Sawada, T., 11.7–204
Sawyer, F. G., (*ed.*), 11.7–19
Schaafsma, N. D. R., 11.7–207
Schaefer, V. J., 11.7–50
Scemeliovas, V. M., 11.7–389
Schlobohm, J. C., 11.7–144
Schmidt, R. C., 11G–61
Schmidt-Nielsen, K., 11.7–383
Schroeder, M. J., 11.7–100, 11G–108
Schumann, T. E. W., 11G–49
Schwartz, S. B., 11.7–126
Schwarze, P., 11.7–289
Schwarzschild, M., 11.7–119
Schweitzer, H., 11.7–82
Seidel, G., 11G–155
Sellick, N. P., 11G–16
Senderikhina, I. L., 11.7–275
Senko, P. K., 11.7–34
Shapaev, V. M., 11.7–313
Sharp, F. A., 11.7–346
Sharpe, J., 11.7–118
Shaw, R. H., 11.7–23, 11.7–92
Shcherbakov, D. I., 11.7–31
Shebalin, O., 11.7–192
Sheĭnis, I. M., 11.7–67
Shirley, J. A., 11.7–344
Shiroma, M., 11.7–354
Shishkin, N. S., 11G–162
Shliamin, B. A., 11.7–194
Showalter, A., 11G–93, 11G–101
Shtabova, A. I., 11G–163
Shumskiĭ, P. A., 11.7–36
Sidak, Z., 11G–143
Silverman, S., 11.7–149
Sinel'nikova, K. K., 11G–121
Sinel'shchikov, V. V., 11.7–45
Sinno, Kenzi, 11.7–160
Sisco, W. B., 11.7–233
Small, R., 11G–133
Smith, F. G., 11.7–20
Smith, W., 11.7–285
Snodgrass, F. E., 11.7–183
Somervell, W. L., Jr., 11.7–327
Spoelstra, P. A., 11.7–91
Srinivasamurthy, B., 11.7–153
Stahmann, J. R., 11.7–76
Starrett, L. G., 11G–55
Steinberg, M., 11.7–187
Stewart, P. G., 11G–188
Stolp, D. W., 11.7–207
Stotsenko, A. V., 11.7–214
Suboch', N. A., 11.7–296
Succi, C., 11.7–137
Sugg, A. L., 11G–75, 11G–82
Summers, P. W., 11.7–267
Suomi, V. E., 11.7–92, 11.7–301
Sutton, R. W., 11.7–229
Suzuki, E., 11G–177, 11G–178
Svensson, S. I., 11.7–127
Swann, W. F. G., 11.7–136
Symmons, P., 11.7–351
Szepesi, Anna, 11.7–367

Takahashi, K., 11G–109
Takayanagi, K., 11.7–150
Tamao, Tsutomu, 11.7–155
Tanczer, T., 11G–180
Taylor, D., 11.7–118
Teweles, S., Jr., 11.7–49, 11G–75, 11G–110
Thompson, J. C., 11G–83, 11G–134
Tick, L. J., 11.7–157
Tillotson, K. C., 11G–62
Titus, R. L., 11G–111
Todd, D. K., 11.7–205
Tomashevich, L. V., 11G–164
Torelli, G., 11.7–137
Trapp, R. F., 11.7–170
Treloar, H. M., 11G–84
Trenkle, H., 11G–155
Troeger, H., 11.7–234, 11.7–312
Troup, A. J., 11.7–287
Tucker, J. M., 11.7–93
Tucker, M. J., 11.7–183
Turketti, Z. L., 11.7–265
Twitchell, P. F., 11G–185

Ueki, H., 11G–50
Ueno, Sueo, 11.7–290
Unanue, J. H., 11.7–372
Ungeheuer, H., 11.7–315
U.S.S.R. Gidrometeorologicheskaia Sluzhba Krasnoi Armii, 11G–29
U. S. Air Force. USAF Historical Div., 11.7–55
U. S. Air Force, 2nd Weather Wing, 11G–179
U. S. Air Weather Service, 11.7–15, 11.7–16, 11G–25, 11G–39, 11G–63, 11G–64, 11G–135
U. S. Bureau of Aeronautics, 11.7–14, 11G–85, 11G–100
U. S. Bureau of Ships, 11.7–18
U. S. Navy, Fleet Weather Central, 11G–85
U. S. Navy Weather Research Facility, 11.7–327
U. S. Office of Naval Operations, 11.7–180
U. S. Soil Conservation Service, 11.7–221
U. S. Weather Bureau, 11.7–83, 11.7–180, 11.7–231, 11G–54, 11G–65, 11G–102, 11G–112, 11G–136, 11G–174
Uralov, N. S., 11.7–197
Urbani, M., 11G–66

Ur'eva, B. B., 11G–192
Urfer, A., 11.7–345
Urick, R. J., 11.7–399
Uspenskiĭ, E., 11G–21

Van Bavel, C. H. M., 11.7–355
van der Bijl, W., 11G–193
Van der Hoven, I., 11G–99
Vanderman, L. W., 11G–189
van der Pol, B., 11.7–65
van den Berg, C., 11.7–207
van Haaren, F. W. J., 11.7–207
van Heusden, G. P. H., 11.7–207
van Nes, B. A., 11.7–207
van Steenis, C. G. G. J., 11.7–98
Van Valkenburg, S., 11.7–294
Viers, G., 11.7–222
Visconti, I., 11G–66
Visser, W. C., 11.7–207
Vitásek, F., 11.7–360
Vitel's, L. A., 11G–190
Vittori, A., 11.7–361
Vogt, J., 11.7–376
Vorontsov, P. A., 11.7–311
Vsesoiuznoe Geograficheskoe Obshchestov, 11.7–43
Vŭlev, M., 11.7–255
Vytchikova, M. A., 11.7–107

Wadsworth, G. P., 11G–48, 11G–67
Wallén, A., 11G–12
Wanders, A. J. M., 11.7–20
Wanta, R. C., 11.7–227
Warman, H. J., 11.7–294
Warwick, Constance S., 11.7–159
Washington (State), Univ. Dept. of Met. and Climatology, 11.7–337, 11G–187
Wasko, P. E., 11G–113
Watanabe, S., 11.7–189
Webb, L. J., 11.7–99
Weickmann, L., 11.7–61
Weightman, R. H., 11G–22
Weinländer, A., 11.7–356
Wells, H. W., 11.7–164
Wexler, H., 11.7–29
White, H. S., 11.7–283
White, R. M., 11G–137, 11G–147
Whitehead, 11.7–42
Widger, W. K., Jr., 11G–68
Wiggett, P. J., 11.7–46
Wiin-Nielsen, A., 11G–95
Williams, P., Jr., 11G–69
Willson, L., 11.7–51
Wilson, C. V., (*ed.*), 11.7–33
Wilson, F., 11.7–260
Wilson, H. P., 11G–114
Wilson, R. K., 11.7–337
Winckler, J. R., 11.7–146
Winter, E. J., 11.7–42
Wisconsin Univ. Dept. of Met., 11.7–259, 11.7–301, 11.7–331
Wisler, C. O., 11.7–206
Wobus, H. B., 11G–110
Wolff, P. M., 11G–75
Wollny, E., 11G–3
Woodbury, M. A., 11G–125
Wood, M. B., 11.7–159
Workman, E. J., 11.7–397
World Meteorological Organization, 11.7–53, 11.7–228
Wormell, T. W., 11.7–394
Wormer, Th. M., 11.7–90

Yacob, A., 11.7–156
Yemm, E. W., 11.7–42
Ylinen, J., 11G–40
Yoshimatsu, Takasaburo, 11.7–176
Yoshimoto, H., 11.7–362
Youngberg, J. A., 11.7–229

Zak, M., 11G–148
Zakharova, A. F., 11.7–378
Zakiev, Kh. Ia., 11.7–321
Zamorskiĭ, A. D., 11.7–71
Zatsepin, G. T., 11.7–135
Zavarina, M. V., 11.7–73
Zenkovich, V. P., 11.7–188
Zhardinskiĭ, S. V., 11.7–197
Ziegra, A., 11G–7
Zinkiewicz, W., 11.7–9
Zoch, R. T., 11G–22
Zubov, N. N., 11.7–298
Zürcher, P., 11.7–102

INDEX OF SUBJECTS

Ångström, Anders, 11.7–58
Ångström's frost formula, 11G–20
Absolute humidity field, 11.7–335
Absorption bands, 11.7–121
Acclimatization, 11.7–106
Acclimatization in tropics, 11.7–108
Acid transformation, 11.7–289
Acoustical propagation, 11.7–399
Acoustical wave reflection, 11.7–398
Actinometers, 11.7–251
Aerodynamics, 11.7–10
Aeronautical meteorological services, 11.7–82, 11.7–83
Aeronautical meteorology, 11.7–266
Aerosol detection, 11.7–269
Agricultural climatology, 11.7–6
Agroclimatic regions, 11.7–381
Agroclimatological indexes, 11.7–84
Agrometeorological forecasting, 11G–120
Agrometeorological indexes, 11.7–84
Agrometeorological stations, 11.7–92
Agronomy textbooks, 11.7–6
Air-borne clinometers, 11.7–197
Air-borne fuel droplets, 11.7–77
Air-borne radiation measurement, 11.7–114
Air conditioning data analysis, 11.7–386
Air conditioning of greenhouses, 11.7–91
Air flow around obstacles, 11.7–274
Air flow over mountain ranges, 11.7–308
Air mass effects on cloudiness, 11.7–349
Air speed effect on icing, 11.7–72
Aircraft damage, 11.7–76
Aircraft weather reconnaissance, 11.7–250
Airplane turbulence observations, 11.7–302
Airport terminal forecasts, 11G–65, 11G–185
Airport visibility, 11.7–78
Airways forecasting, 11G–59
Albedo measurement, 11.7–236
Altocumulus castellatus clouds, 11G–148
Aluminum oxide nuclei, 11.7–341
Amateur forecasts, 11G–170
American Geophysical Union. Committee on Cosmic-Terrestrial Relationships, 11.7–39
American Meteorological Society activities, 11.7–48
Analog selection, 11G–48, 11G–63

Analogs, 11.7–101
Anemometers, 11.7–10
Animal ecology, 11.7–190
Annual climatological data summaries, 11.7–247
Annual hydrological reports, 11.7–208
Annual meteorological data summaries, 11.7–243, 11.7–244
Annual rainfall maps, 11.7–373
Antarctic sea ice, 11.7–201
Applied meteorology, 11G–86
Artic air circulation, 11.7–33
Arctic drift expeditions, 11.7–31
Arctic expeditions, 11.7–32
Arctic exploration, 11.7–30
Arctic meteorology seminars, 11.7–33
Arctic Ocean research, 11.7–200
Arctic stratospheric charts, 11.7–29
Arctic weather forecasting, 11G–114, 11G–187
Arctowski, Henryk, 11.7–59
Artificial lightning studies, 11.7–76
Astronautics, 11.7–167
Astronomical instruments, 11.7–127
Astronomy, 11.7–1
Astrophysics, 11.7–1
Atmospheric composition, 11.7–233, 11.7–268
Atmospheric electricity measurement, 11.7–230
Atmospheric electricity measurement by airplane, 11.7–295
Atmospheric electricity measurement by radio, 11.7–294
Atmospheric electricity station registers, 11.7–241
Atmospheric models, 11.7–273
Atmospheric pollution, 11.7–114, 11.7–270, 11.7–271
Atmospheric pollution effects on eyes, 11.7–104
Atmospheric pollution handbooks, 11.7–19
Atmospheric radiation, 11.7–291
Atmospheric tides, 11.7–300
Atmospheric turbulence, 11.7–74, 11.7–239
Atomization of fuels, 11.7–77
Auroral emissions, 11.7–141
Auroral energy excitation mechanisms, 11.7–141, 11.7–143
Auroral green line, 11.7–147
Auroral ionization, 11.7–163
Auroral nitrogen bands, 11.7–148
Auroral photometry, 11.7–148
Auroral radiation, 11.7–146, 11.7–164
Auroral rays, 11.7–142
Auroral spectrograms, 11.7–141, 11.7–143
Auroral theories, 11.7–57
Auröras, 11.7–142, 11.7–145, 11.7–146
Automatic weather stations, 11.7–248
Aviation forecasting, 11G–169

Balloon flight observations, 11.7–249
Baroclinic effect, 11G–118
Baroclinic models, 11G–189
Barometer corrections, 11.7–255
Barometric leveling, 11.7–300
Barotropic models, 11G–116, 11G–149, 11G–151, 11G–167, 11G–171, 11G–180, 11G–189
Barotropic tendency computation, 11G–118
Beach cusps, 11.7–186, 11.7–187
Beach meandering, 11.7–186, 11.7–187
Beach sand accumulation, 11.7–188
Beach sand movement, 11.7–188
Bibliography of Russian meteorological textbooks, 11.7–68
Bibliography on forecast verification, 11G–31
Bibliography on forecasting, 11G–35
Bibliography on objective forecasting, 11G–122
Bi-monthly pressure anomaly charts, 11G–142
Bioclimatology, 11.7–372
Biography of Anders Ångström, 11.7–58
Biography of Johannes Georgi, 11.7–60
Biography of Hugo Hergesell, 11.7–61
Biography of B. van der Pol, 11.7–65
Biography of Alfred Wenger, 11.7–66
Bird navigation, 11.7–81
Bjerknes circulation theorem, 11.7–181
Blood clotting, 11.7–102
Bog hydrology, 11.7–215
Bog science textbooks, 11.7–215
Bora, 11.7–317
Boundary layer theory, 11.7–330
Bregnet-9as glider, 11.7–79
Brightness contrast, 11.7–390
BBC forecasts, 11G–153
Bumpiness, 11.7–75

Ceiling and visibility, 11G–64
Ceiling and visibility data, 11.7–78
Ceiling and visibility forecasting, 11G–185
Ceilometers, 11.7–260
Celestial mechanics, 11.7–168
Celestial navigation by birds, 11.7–81
Circumlunar satellites, 11.7–173
Citrus orchards, 11G–9
Climagrams, 11.7–108
Climate and tree growth, 11.7–375
Climate controlled greenhouses, 11.7–42
Climate of Altai Territory, 11.7–369
Climate of Bering Sea, 11.7–194
Climate of Europe, 11.7–13
Climate of Iowa, 11.7–23
Climate of Kuba-Khachmas range, Azerbaidzhan, 11.7–371
Climate of Maritime Territory, U.S.S.R., 11.7–368
Climate-potato yield relationships, 11.7–85
Climatic amelioration, 11.7–374
Climatic changes, 11.7–375
Climatic changes in Iran, 11.7–4
Climatic classification of world, 11.7–12
Climatic data for forecast verification, 11G–124
Climatic effects on fish, 11.7–193
Climatic effects on maize, 11.7–86
Climatic effects on plant regeneration, 11.7–98
Climatic influences on periodicity of leaf charge and flowering, 11.7–96
Climatic influences on water regime, 11.7–97
Climatic trends, 11.7–376
Climatological forecasting, 11.7–264
Climatology of Turkey, 11.7–7
Climatology textbooks, 11.7–7, 11.7–11

Cloud height indicators, 11.7–260
Cloud systems, 11.7–348
Cloudiness at sea, 11.7–346
Cloudiness data, 11.7–348, 11.7–349
Coastal climates, 11.7–377
Coastal configuration effects on typhoon movement, 11.7–282
Code specifications, 11.7–17
Cold air invasions, 11.7–299
Cold fronts in Australia, 11.7–287
Cold wave forecasting, 11G–188
Collected geographical papers, 11.7–43
Comfort indexes, 11.7–386
Commercial meteorology, 11.7–111
Communication manuals, 11.7–15, 11.7–16
Computer programs, 11G–29
Confidence forecasts, 11G–131
Constant absolute vorticity trajectories, 11G–130
Constant pressure surface forecasts, 11G–130
Contrail photographs, 11.7–347
Contrast threshold, 11.7–390
Control line method, 11G–113
Convection currents, 11.7–332
Convective clouds, 11.7–333
Convective heat exchange, 11.7–305
Convergence and divergence, 11.7–298
Cook's Journal, 11.7–201
Coriolis effects, 11.7–181
Coronal electron temperature, 11.7–126
Corpuscular radiation, 11.7–292, 11.7–293
Corpuscular theories of geomagnetic storms, 11.7–152
Correlation of weather parameters, 11G–106
Correlations, 11G–15, 11G–16
Cosmic effects, 11.7–39
Cosmic ray instruments, 11.7–137
Cosmic ray intensities, 11.7–133, 11.7–134
Cosmic ray ionization, 11.7–395
Cosmic ray particles, 11.7–137
Cosmic ray showers, 11.7–135
Cosmic rays, 11.7–146
Cranberry bogs, 11G–10
Cyclogenesis, 11G–105
Cyclone development, 11G–141
Cyclone development forecasting, 11G–157
Cyclone formation, 11.7–280, 11G–103
Cyclone movement forecasting, 11G–95

Depletion curves, 11.7–365
Desert animal ecology, 11.7–383
Dew point forecasting, 11G–173
Diffuse reflection, 11.7–290
Diffusion, 11.7–276
Diurnal sudden commencement variations, 11.7–153
Diurnal wind variations, 11.7–313
Drift ice, 11.7–204
Drift ice meteorological stations, 11.7–248
Drifting station Bravo (T-3), 11.7–200
Drought effects on crop yield, 11.7–353
Drought probability, 11.7–355
Dry and wet climate alternation, 11.7–376
Dust, 11.7–272
Dust prevention, 11.7–336
Dust storms, 11.7–272
Dynamic climatology, 11.7–389

Earth currents, 11.7–176
Eclipses, 11.7–127
Ecoclimatology, 11.7–94
Ecology of deep seas, 11.7–190
Economics of forecasts, 11G–13
Economics of weather forecasts, 11G–134
Effective temperatures, 11.7–386
Efficiency tests, 11G–99
Electric field variations, 11.7–394
Electrical conductivity over oceans, 11.7–395
Electrical conductivity over thunderstorms, 11.7–357
Electricity of precipitation, 11.7–357
Electrification of clouds, 11.7–396
Electroconvective vortices, 11.7–280
Electromagnetic effects on cosmic rays, 11.7–136
Electromagnetic radiation, 11.7–293
Electromagnetic wave propagation, 11.7–65
Electron density in exosphere, 11.7–233
Electronic computers, 11.7–3, 11G–88
Electronic equipment, 11.7–18
Elementary meteorology textbooks, 11.7–9
Empirical influence functions, 11G–137
Encyclopedias, 11.7–1
Engineering hydrology, 11.7–205
Entropy, 11G–178
Evaporation bibliographies, 11.7–363
Evaporation calculations, 11.7–367
Evaporation from reservoirs, 11.7–338
Evaporation from wind-swept surfaces, 11.7–339
Evaporation over earth, 11.7–12
Evaporation reduction, 11.7–338
Excessive rainfall, 11.7–211
Expedition, 1954, 11.7–31
Extended forecast verification, 11G–174
Extended forecasting, 11G–26, 11G–38, 11G–39, 11G–51, 11G–74, 11G–97, 11G–131, 11G–137, 11G–144, 11G–155, 11G–161, 11G–192
Extended forecasting methods, 11G–163
Extratropical cyclone forecasting, 11G–103
Eye irritation, 11.7–104

F layers, 11.7–140
F1 layer critical frequencies, 11.7–140
F2 layer critical frequencies, 11.7–140
Fire behavior studies, 11.7–100
Fire danger to aircraft, 11.7–76, 11.7–77
Fire weather forecasting, 11G–81, 11G–108, 11G–129, 11G–133
Fire weather investigation, 11.7–100
500 mb data extrapolation, 11.7–327
Fjørtoft's graphical method, 11G–141
Flight planning, 11G–179
Flood damage, 11.7–211
Flood forecasting formulas, 11.7–218
Floods, Ardèche (Oct. 1958), 11.7–364
Floods, Cévennes, France (Oct. 1958), 11.7–210 to 11.7–213
Floods, France (1471–1958), 11.7–209
Floods, Maritime Province, 11.7–214

Flowering of plants, 11.7–384
Fluid mechanics, 11.7–280
Flying weather forecasts, 11G–80
Föhn effect on blood clotting, 11.7–102
Föhn effects on criminality, 11.7–315
Föhn sickness, 11.7–316
Fog forecasting, 11G–23, 11G–46, 11G–71
Fog formation, 11.7–345
Forecast accuracy, 11G–34, 11G–41, 11G–67, 11G–84, 11G–117, 11G–147, 11G–150, 11G–154, 11G–170, 11G–179
Forecast aids, 11G–35, 11G–85
Forecast errors, 11G–54, 11G–106, 11G–115, 11G–152, 11G–164
Forecast evaluation, 11.7–265, 11G–17, 11G–34, 11G–185
Forecast improvement, 11G–65
Forecast manuals, 11G–29
Forecast probabilities, 11G–69
Forecast usefulness, 11G–182
Forecast utilization, 11G–159
Forecast verification, 11G–1 to 11G–194
Forecast verification programs, 11G–124
Forecasting cold lows, 11G–79, 11G–114
Forecasting skill, 11G–14, 11G–56, 11G–86, 11G–123, 11G–124, 11G–125, 11G–193
Forecasting skill calculations, 11G–125, 11G–126
Forecasting soil moisture, 11.7–87
Forecasting symposia, 11G–75
Forecasting techniques, 11G–83, 11G–114, 11G–158, 11G–171
Forest ecology, 11.7–93
Forest hydrology, 11.7–216
Forest influences on water regime, 11.7–97
Forest microclimatology, 11.7–94
Forest phenology, 11.7–95, 11.7–96
Forest soil moisture, 11.7–216
Forestry, 11.7–375
Freezing of supercooled water, 11.7–340
French Meteorological Service, 11.7–44
Frontal effects on mortality, 11.7–101
Frontal-Föhn effect analogs, 11.7–101
Frost forecasting, 11G–1, 11G–3, 11G–7, 11G–10, 11G–18, 11G–20, 11G–21, 11G–32, 11G–50
Frost forecasting formulas, 11G–9, 11G–128
Frost protection of roads, 11G–13
Frost resistant wheat, 11G–128
Fruit cultivation, 11.7–88
Fruit-Frost Service, 11G–102

γ-radiation spectrometry, 11.7–112
Gardner-Scherhag instability index, 11G–101
Gas mechanics, 11.7–279
Geiger counter, 11.7–118
General meteorology for geographers, 11.7–9
Geographical congresses, 11.7–43
Geography, 11.7–43
Geography of Iran, 11.7–4
Geomagnetic disturbances due to solar corpuscles, 11.7–152
Geomagnetic effect on auroras, 11.7–57
Geomagnetic effects on ionosphere, 11.7–140
Geomagnetic field distortion, 11.7–155
Geomagnetic storms, 11.7–158
Geomagnetic storm-pressure-height gradients relationships, 11.7–157
Geomagnetic theories, 11.7–
Geomagnetic theories, 11.7–151, 11.7–152
Geomagnetic variations, 11.7–155, 11.7–156
Geomagnetic yearbooks, 11.7–244
Geomorphology, 11.7–177, 11.7–318
Geomorphology bibliographies, 11.7–178
Geomorphology of arid lands, 11.7–376
Geomorphology textbooks, 11.7–178
Geophysical data, 11.7–34
Geophysical observatories, 11.7–47
Geophysics, 11.7–1
Georgi, Johannes, 11.7–60
Glacier photographs, 11.7–225
Glacier retreat, 11.7–224
Glaciological observations, 11.7–225
Glider flights, 11.7–79
Global radiation data, 11.7–242
Graphical prediction models, 11G–171, 11G–180
Graphical presentation, 11G–186
Grassland microclimatology, 11.7–380
Greenhouse microclimate, 11.7–91
Greenland Ice Cap, 11.7–343
Ground water hydrology textbooks, 11.7–205
Ground water surveys, 11.7–219
Ground water table, 11.7–366
Gust frequencies, 11.7–74
Gustiness, 11.7–74

Hail, 11.7–340
Hailstone densities, 11.7–361
Hair hygrometers, 11.7–234
Hergesell, Hugo, 11.7–61
High altitude effects on man, 11.7–105
High level winds, 11.7–328
Historic floods, 11.7–209
History, 11G–33
History of geophysical organizations, 11.7–47
History of hydrology, 11.7–54
History of solar radiation research, 11.7–56
History of U. S. Air Force, 11.7–55
Horiguti, Yosiki, 11.7–62
Humidity control, 11.7–336
Humidity gradient measurement techniques, 11.7–237
Humidity variations, 11.7–321
Hurricane "Betsy" (1956), 11.7–281
Hurricane damage to forests, 11.7–284
Hurricane statistics, 11.7–283
Hurricanes, North Atlantic (1886–1958), 11.7–283
Hydrodynamics, 11.7–181
Hydroelectric power, 11.7–362
Hydrography, 11.7–374, 11G–42
Hydrologic balance, 11.7–54
Hydrologic forecasting, 11G–92
Hydrologic research, 11.7–207
Hydrology, 11.7–54
Hydrology bibliographies, 11.7–363
Hydrology of the Regen River, 11.7–97
Hydrology textbooks, 11.7–68, 11.7–206
Hydrology yearbooks, 11.7–208
Hydrometeorology, 11.7–222

Ice crystal theory of auroral arc, 11.7–57
Ice nuclei formation, 11.7–340
Ice terminology, 11.7–198

Iceberg measurement instruments, 11.7–197
Icebergs, 11.7–198, 11.7–202
Icing of aircraft, 11.7–33, 11.7–72
Indian participation in IGY, 11.7–25
Industrial forecasting, 11G–182
Industrial pollution, 11.7–104
Information indexing, 11.7–69
Information theory, 11G–159, 11G–178
Instrument exposure, 11.7–230
Instrument testing reports, 11.7–260
International code manuals, 11.7–228
IGY, 1957–1958, 11.7–26, 11.7–27
IGY Antarctic expeditions, 11.7–35
IGY ionosphere program, 11.7–25
IGY program, 11.7–26
IGY research, 11.7–27
Interplanetary flights, 11.7–170
Interplanetary vehicles, 11.7–169
Ion concentration measurements, 11.7–107
Ion density measurement techniques, 11.7–249
Ionization effects on human organisms, 11.7–271
Ionospheric conferences, 11.7–139
Ionospheric effects on radio stars, 11.7–166
Ionospheric networks, 11.7–25
Ionospheric radio wave propagation, 11.7–37
Ionospheric storm forecasting, 11G–98
Isothermal charts, 11.7–370
Ivanov's climatic classification, 11.7–12

Japanese Antarctic Research Expedition III, 11.7–199
Jet stream, 11.7–324
Jet stream clouds, 11.7–346
Jet stream turbulence, 11.7–329
Juvenile meteorology books, 11.7–24

Kammermann's frost formula, 11G–3, 11G–7, 11G–18
Kinematic analyses, 11G–76

Lake breezes, 11.7–311
Land leveling, 11.7–366
Landscape-climate classification, 11.7–12
Lee waves, 11.7–79
Leukemia prevention, 11.7–117
Levandovskiĭ, Kazimir Frantsevich, 11.7–63
Lightning strokes on airplanes, 11.7–76
Local climatic studies, 11.7–377
Local winds, 11.7–314
Long range forecasting, 11G–15, 11G–16, 11G–24, 11G–30, 11G–33, 11G–37, 11G–47, 11G–58, 11G–60, 11G–84, 11G–117, 11G–156, 11G–158
Long range precipitation forecasting, 11G–142
Long range temperature forecasting, 11G–142
Long waves, 11G–75
Low frequency wave spectra, 11.7–183
Low level turbulence, 11.7–302
Lunar diurnal magnetic variations, 11.7–154
Lunar effects, 11.7–133
Lunar exploration, 11.7–169
Lunar luminescence, 11.7–120
Lunik II, 11.7–175
Lunik III, 11.7–174

Magnetic effects from meteors, 11.7–161
Magnetic field of moon, 11.7–120, 11.7–133
Maize cultivation, 11.7–86
Marine climatic atlases, 11.7–180
Marine forecasting, 11G–42
Mars, 11.7–122, 11.7–170
Mathematical forecasting, 11G–40
Maximum temperature forecasting, 11G–173
Medical meteorological forecasting service, 11G–139
Mercurial barometers, 11.7–254, 11.7–255
Mesoanalysis, 11.7–264
Mesoanalysis of tornadoes, 11.7–285
Mesometeorological networks, 11.7–240
Meteor echo measurement techniques, 11.7–132
Meteor echoes, 11.7–131
Meteor ionization trails, 11.7–131, 11.7–147
Meteor spectra, 11.7–147
Meteor trail wind observations, 11.7–129
Meteoric astronomy, 11.7–293
Meteorological conferences, 11.7–40
Meteorological courses, 11.7–53
Meteorological data, 11.7–46
Meteorological education, 11.7–53
Meteorological exhibitions, 11.7–45
Meteorological glossaries, 11.7–71
Meteorological research, 11.7–40, 11.7–50
Meteorological research institutes, 11.7–44
Meteorological research space flights, 11.7–171
Meteorological services, 11.7–111
Meteorological statistics textbooks, 11G–175
Meteorological transmission, 11.7–15, 11.7–16
Meteorology abstracts, 11.7–67
Meteorology in literature, 11.7–22, 11.7–51
Meteorology textbooks, 11.7–11
Meteors, 11.7–130, 11.7–161
Microbiological method for ocean investigation, 11.7–191
Micrometeorological conferences, 11.7–38
Mikhalevskiĭs frost formula, 11G–20
Miniaturized electronic equipment, 11.7–18
Minimum temperature atlases, 11.7–294
Minimum temperature forecasting, 11G–2, 11G–11, 11G–102, 11G–145
Mirages, 11.7–392
Moisture effects on pasture yields, 11.7–87
Moisture loss, 11.7–365
Molchanov, Lev. A., 11.7–64
Monsoon fluctuation, 11.7–193
Moonsoon forecasting, 11G–107
Monthly climatic anomalies, 11.7–245, 11.7–246
Monthly weather forecasts, 11G–156
Moon, 11.7–120
Moon backside photography, 11.7–174
Multiple correlation forecasting, 11G–92

Nacreous clouds, 11.7–393
Natural synoptic periods, 11G–192
Natural synoptic processes, 11G–163
Nimbostratus, 11.7–396
Nitrogen excitation, 11.7–149
Nomograms, 11G–145

Nongeostrophic wind flow, 11.7–274
North Atlantic air routes, 11G–94
Nuclear propelled interplanetary vehicles, 11.7–170
Nuclear radiation detection instruments, 11.7–118
Nuclear radiation measurement techniques, 11.7–118
Nuclei effectiveness, 11.7–341
Nuclei sources, 11.7–342
Numerical 5-day forecasting techniques, 11G–174
Numerical forecast accuracy, 11G–168
Numerical forecast verification, 11G–176
Numerical forecasting, 11G–51, 11G–52, 11G–78, 11G–88, 11G–114, 11G–116, 11G–120, 11G–141, 11G–151, 11G–177, 11G–179
Numerical forecasting errors, 11G–149, 11G–166, 11G–167, 11G–189
Numerical forecasting evaluation, 11G–180
Numerical forecasting for Arctic, 11G–187
Numerical forecasting techniques, 11G–160
Numerical pressure forecasting, 11G–150
Numerical wind speed forecasts, 11G–176

Oak trees, 11.7–93
Obituary of Henryk Arctowski, 11.7–59
Obituary of Yosiki Horiguti, 11.7–62
Obituary of Kazimir Frantsevich Levandovskiĭ, 11.7–63
Obituary of L. A. Molchanov, 11.7–64
Objective cold wave forecasting, 11G–188
Objective contour height forecasting, 11G–137
Objective forecasting, 11G–23, 11G–35, 11G–37, 11G–45, 11G–46, 11G–57, 11G–61, 11G–62, 11G–64, 11G–65, 11G–75, 11G–80, 11G–81, 11G–93, 11G–105, 11G–122, 11G–135, 11G–185
Objective precipitation forecasting, 11G–104
Objective wind forecasting, 11.7–267
Observational data, 11.7–244
Observers manuals, 11.7–17
Ocean currents, 11.7–182
Ocean wave data analysis, 11.7–184
Ocean wave spectra, 11.7–183
Oceanic tides, 11.7–181
Oceanographic investigation, 11.7–179
Oceanographic research, 11.7–191, 11.7–195
Oceanography of Baltic Sea, 11.7–192
Oceanography of Bering Sea, 11.7–194
Oceanography textbooks, 11.7–68, 11.7–179
Optical theories, 11.7–392
Orographic effects on atmospheric circulation, 11.7–274
Orographic effects on cyclogenesis, 11.7–387
Orographic effects on wind, 11.7–388
Orographic influences, 11.7–306
Outer atmosphere symposia, 11.7–41
Oxygen lines, 11.7–148

Pack ice, 11.7–199
Paleomagnetic measurements, 11.7–162
Paleomagnetism, 11.7–162
Pastures, 11.7–87
Periodicities, 11G–109
Photoelectric nuclei counters, 11.7–138
Photomultipliers, 11.7–292
Photoperiodism, 11.7–384
Physical geography, 11.7–368
Physical geography, Altai Territory, 11.7–369
Physical geography textbooks, 11.7–13
Physics for meteorologists, 11.7–49
Physics textbooks, 11.7–8
Phytotron, 11.7–42
Pilot reports, 11.7–266
Plant climatology experiments, 11.7–42
Polar whiteout, 11.7–343
Popular meteorology, 11.7–23, 11.7–42
Popular science books, 11.7–20
Postpluvial climates, 11.7–93
Potato blight forecasting, 11G–96
Potato yield, 11.7–85
Poynting-Robertson effect, 11.7–293
Precipitation data, Animas Valley, N. M., 11.7–219
Precipitation deficiency, 11.7–353
Precipitation forecasting, 11G–61, 11G–73
Precipitation probability, 11G–108
Prescribed burning surveys, 11.7–100
Pressure changes, 11.7–299
Pressure effects on sea level, 11.7–298
Pressure fields, 11.7–387
Pressure-height forecasts, 11G–137
Pressure pattern flying, 11G–94
Pressure tendencies, 11G–151
Pressure tendency forecasting, 11G–121
Primary cosmic rays, 11.7–134
Probabilities, 11G–97
Probability forecasting, 11G–27
Prognostic charts, 11G–48, 11G–54, 11G–66, 11G–77, 11G–78, 11G–110, 11G–113, 11G–151, 11G–179
Prognostic surface charts, 11G–95
Progress in meteorology, 11.7–48
Project Ice Skate, 11.7–200
Public information services, 11.7–46
Publication indexes, 11.7–70
Pulmonary embolism, 11.7–103
Punched card application to forecast verification, 11G–25, 11G–155
Punched card applications, 11G–136
Punched card methods, 11G–68

Quaternary glaciation, 11.7–223

Radar content of atmosphere, 11.7–113
Radar equipment, 11.7–263
Radar observation of auroras, 11.7–144
Radar observation of hurricanes, 11.7–281
Radar weather instrumentation, 11.7–229
Radiation absorption, 11.7–163
Radiation climate, 11.7–291
Radiation flux, 11.7–275
Radiation fog, 11.7–345
Radiation intensities, 11.7–291
Radiative transfer, 11.7–275, 11.7–290
Radio astronomy, 11.7–20
Radio echoes from auroras, 11.7–144
Radio echoes from meteor trails, 11.7–304
Radio-isotope measurement techniques, 11.7–118

Radio star scintillation, 11.7–163, 11.7–166
Radio telescopes, 11.7–165
Radio wave propagation conferences, 11.7–37
Radioactive fallout dose patterns, 11.7–309
Radioactive fallout patterns, 11.7–116
Radioactive pollution of atmosphere, 11.7–114, 11.7–115
Radioactive tracers in meteorology, 11.7–115
Radioactivity effects on leukemia, 11.7–117
Radioactivity in the atmosphere, 11.7–113
Radioactivity meteorology, 11.7–115
Radiogoniographs, 11.7–258
Radiogoniometers, 11.7–258
Radiosonde data, 11.7–337
Radiosondes, 11.7–262
Rain forest climate, 11.7–99
Rain gages, 11.7–261
Rainfall analysis, 11.7–351
Rainfall charts, 11.7–373
Rainfall data, 11.7–350
Rainfall distribution, 11.7–212, 11.7–352, 11.7–364
Rainfall forecasting, 11G–82
Rainfall frequency determination, 11.7–235
Rainfall intensities, 11.7–209, 11.7–210, 11.7–213, 11.7–364
Rainfall intensity-flood discharge relationships, 11.7–212
Rainfall intensity-frequency regime, 11.7–235
Rainfall measurement techniques, 11.7–261
Rainfall probability, 11G–73
Rainfall-runoff relationships, 11.7–54
Rainstorm forecasting, 11G–162
Rainstorms, 11.7–351
Rand Corporation Publications, 11.7–70
Rawin observation manuals, 11.7–231
Record rainfall, 11.7–354
Recording anemometers, 11.7–256
Re-entry into the atmosphere, 11.7–172
Refraction phenomena, 11.7–391
Regional climatology, 11.7–13
Reptile ecology, 11.7–385
Respiratory physiology, 11.7–105
Rice paddy microclimatology, 11.7–382
River basins, 11.7–217
River micrometeorology, 11.7–379
River runoff data, 11.7–220
Rossby vorticity theory, 11G–146
Rotating plates, 11.7–181
Runoff data, 11.7–220
Runoff trends, 11.7–362
Russian textbooks, 11.7–68

Sailing weather, 11.7–21
Sailplanes, 11.7–80
Salinity distribution, 11.7–193
Satellite instrumentation, 11.7–174, 11.7–175
Satellite observatories, 11.7–168
Satellite re-entry, 11.7–172, 11.7–173
Scintillation counters, 11.7–112
Scintillation effects, 11.7–138
Scintillation measurement techniques, 11.7–292
Sea breeze circulation, 11.7–310
Sea breeze forecasting, 11.7–287
Sea currents, 11.7–181
Sea ice conditions, 11.7–204
Sea ice damage, 11.7–204
Sea ice data, 11.7–203
Sea ice formation, 11.7–202
Sea ice properties, 11.7–196
Sea level changes, 11.7–185
Sea level pressure distribution, 11.7–267
Sea surface temperature data, 11.7–198
Sea temperatures, 11.7–193
Seasonal cloudiness variations, 11.7–349
Seasonal forecasting, 11G–84, 11G–109, 11G–190
Seasonal metabolism variations, 11.7–385
Seasonal runoff forecasting, 11G–92
Selsyn anemometer, 11.7–256
"Severnyi Polius," 11.7–31
Shannon-Gander air route, 11G–132
Shelter belt effects on air currents, 11.7–321
Shelter belt effects on snow cover, 11.7–319
Shelter belt microclimatology, 11.7–320
Short range forecasting, 11G–28, 11G–35, 11G–67, 11G–105
Showalter's Stability Index, 11G–101
Showalter's Tornado Index, 11G–101
Single station data specification, 11.7–327
Skill score calculation, 11G–127
Skill scores, 11G–191
Slope microclimatology, 11.7–378
Small craft navigation, 11.7–21
Small nuclei, 11.7–342
Smith's frost formula, 11G–9 to 11G–11
Smithsonian Institution, Wash., D. C., 11.7–56
Snow cover, 11.7–5
Snow cover distribution, 11.7–319
Snow cover distribution with elevation, 11.7–359
Snow forecasting, 11G–45
Snow line height determinations, 11.7–360
Snow removal, 11.7–5
Snow survey data, 11.7–221
Snow surveys, 11.7–358
Soil aeration effects on root growth, 11.7–216
Soil climates in Siberia, 11.7–2
Soil conservation, 11.7–323
Soil heat conductivity calculation, 11.7–297
Soil heat flux calculation, 11.7–296
Soil improvement, 11.7–366
Soil moisture, 11.7–90, 11.7–366
Soil moisture coefficients, 11.7–12
Soil moisture exchange, 11.7–365
Soil moisture measurement, 11.7–367
Soil moisture requirements, 11.7–353
Soil moisture retention, 11.7–355
Soil temperature data, 11.7–244
Solar activity, 11.7–140
Solar coronas, 11.7–124 to 11.7–126
Solar corpuscular radiation, 11.7–160
Solar diurnal magnetic variations, 11.7–154
Solar eclipse, June 1954, 11.7–124
Solar eclipse, Oct. 1959, 11.7–128
Solar flare patrol, 11.7–25
Solar-geomagnetic relationships, 11.7–158 to 11.7–160
Solar granulation photographs, 11.7–119

Solar heating, 11.7–288
Solar houses, 11.7–288
Solar prominences, 11.7–158
Solar radiation data, 11.7–244
Solar radiation measurements, 11.7–56
Solar radiation on slopes, 11.7–378
Solar-weather relationships, 11.7–159
Sonic anemometers, 11.7–259, 11.7–331
Sound transmission in seawater, 11.7–399
Southwest monsoon onset, 11G–107
Soviet Antarctic expeditions, 11.7–35
Soviet Antarctic research, 11.7–34, 11.7–36, 11.7–38
Soviet Arctic expeditions, 11.7–30
Soviet Arctic research, 11.7–28
Soviet Hydrometeorological Service, 11.7–45
Soviet ice floe stations, 11.7–31
Soviet interplanetary space stations, 11.7–175
Soviet long range forecasting methods, 11G–163
Soviet participation in IGY, 11.7–28, 11.7–35, 11.7–36, 11.7–45
Space flights, 11.7–171
Spectral theories, 11.7–150
Spectrophotometric study of light reflection, 11.7–236
Sporadic meteor echoes, 11.7–132
Stability, 11.7–273
Stability-moisture index, 11G–93
Stack effluent diffusion, 11.7–302
Standard atmosphere, 11.7–105
Stationary front analysis, 11.7–264
Statistical analysis, 11.7–184, 11G–154
Statistical forecasting, 11G–39, 11G–63, 11G–119, 11G–155, 11G–165, 11G–175, 11G–183, 11G–193
Statistical studies, 11G–58, 11G–87
Statistical studies of winds aloft, 11.7–325
Statistical techniques, 11G–147
Statistics in meteorology, 11G–175
Steam fog, 11.7–344
Storm warnings, 11G–12
Stratospheric observation of solar granulation, 11.7–119
Stratospheric pressure, 11.7–328
Stratospheric temperatures, 11.7–29
Stratospheric-tropospheric flow relationships, 11.7–326
Stratospheric winds, 11.7–324
Stratus forecasting, 11G–65, 11G–194
Strontium^{90} in rainwater, 11.7–116
Strontium^{90} stratospheric storage, 11.7–116
Subject classification, 11.7–69
Submarine light distribution measurement techniques, 11.7–189
Sudden commencement frequencies, 11.7–153
Sulphur, 11.7–268
Summer cool change, Southeast Australia, 11.7–287
Sunset colors, 11.7–391
Sunspot data analysis, 11.7–123
Sunspot effects on radio communication, 11.7–164
Sunspot-magnetic storm relationships, 11.7–164
Surface wind data, 11.7–306
Surface wind forecasts, 11.7–267
Swedish Radioscientific Solar Eclipse Expedition to Italy, 1952, 11.7–127
Synoptic analysis, 11G–33, 11G–40, 11G–66, 11G–99, 11G–164
Synoptic analysis of tropical cyclones, 11G–172
Synoptic chart preparation, 11.7–228
Synoptic conditions for aircraft bumpiness, 11.7–75
Synoptic conditions for floods, 11.7–222
Synoptic conditions for heavy rainfall, 11.7–210
Synoptic conditions for tornadoes, 11G–91
Synoptic forecasting, 11G–24, 11G–147
Synoptic studies, 11.7–210

Teaching of meteorology, 11G–68
Tectonics, 11.7–177
Telemetering psychrometers, 11.7–237
Telemetering systems, 11.7–237
Telephone exchanges, 11.7–336
Television weather broadcasts, 11G–153
Temperature calculations, 11G–138
Temperature data, 11.7–370
Temperature drop, 11.7–311
Temperature effects on flowering and fruiting, 11.7–88
Temperature effects on winter wheat, 11.7–89
Temperature forecasting, 11.7–265, 11G–119, 11G–138
Temperature gradient measurement techniques, 11.7–237
Temperature instruments, 11.7–252, 11.7–253
Temperature inversions, 11.7–391
Temperature measurement techniques, 11.7–18, 11.7–252, 11.7–253
Temperature stratification, 11.7–295
Temperature variations, 11.7–362
Temperature variations due to shelter belts, 11.7–321
Theodolites, 11.7–257
Thermal balance of animals, 11.7–385
Thermals, 11.7–334
Thermocouples, 11.7–237
Thermometers, 11.7–252, 11.7–253
Thoreau, H. D., 11.7–51
Thornthwaite's classification, 11.7–96
Thornthwaite's method, 11.7–367
3-day forecast verification, 11G–163
300 mb trajectories, 11.7–14
Thunderstorm analysis, 11.7–264
Thunderstorm electricity, 11.7–397
Thunderstorm forecasting, 11G–62, 11G–81, 11G–93, 11G–101, 11G–148, 11G–162
Thunderstorm observation techniques, 11.7–226
Topographic effects on climate, 11.7–371
Topographic effects on rainfall, 11.7–352, 11.7–356
Tornado, Texas (May (1955), 11.7–285
Tornado development, 11.7–286
Tornado distribution, 11G–55
Tornado films, 11.7–286
Tornado forecasting, 11G–55, 11G–91, 11G–101
Tornado formation, 11G–91

Tornado measurements, 11.7–286
Tornadoes, Nebr. (June 1955), 11.7–286
Tower data, 11.7–302
Training manuals, 11G–85
Trajectory forecasting manuals, 11.7–14
Transatlantic wind forecasts, 11G–94
Transosonde trajectories, 11.7–14
Transpiration of trees, 11.7–90
Tropical cyclone track forecasting, 11G–100
Tropical hygiene textbooks, 11.7–108
Tropical rain forests, 11.7–98
Tropical storm tracks, 11.7–283
Tropical vegetation, 11.7–99
Turbulence effects on jettir soned aircraft fuels, 11.7–77
Turbulence effects on meteoechoes, 11.7–304
Turbulence in rarefied gases, 11.7–279
Turbulence instrumentation, 11.7–259
Turbulence research, 11.7–301
Turbulence scale, 11.7–276
Turbulence spectra, 11.7–239, 11.7–276 11.7–302
Turbulent diffusion, 11.7–295, 11.7–303,
Turbulent diffusion-electric field relationships, 11.7–394
Turbulent exchange, 11.7–305
Turbulent transfer of heat, 11.7–277, 11.7–301
Turbulent transfer of momentum, 11.7–301
Turbulent viscosity, 11.7–278
Turkish language, 11.7–49
Twilight observation of aerosol layers, 11.7–269
Typhoon movement, 11.7–282
Typhoon precipitation distribution, 11.7–354
Typhoon "Tess" (1953), 11G–172
Typhoon theories, 11G–172

Ultraviolet light effects on acids, 11.7–289
U.S.S.R. Central Inst. of Forecasting, 11G–192
U.S.S.R. satellites, 11.7–174, 11.7–175
U. S. Air Weather Service, 11.7–55
Updrafts, 11.7–79
Upper air analysis, 11G–76, 11G–149, 11G–166, 11G–167, 11G–181
Upper air charts, 11G–75
Upper air forecast accuracy, 11G–183
Upper air frequency charts, 11.7–180
Upper air wind computation, 11.7–238
Upper air wind data, 11.7–325
Upper air wind estimation, 11.7–327
Upper air wind forecast accuracy, 11G–94, 11G–132, 11G–152, 11G–184
Upper air wind measurement techniques, 11.7–129
Upper air wind observations, 11G–94
Upper level ridge forecasting, 11G–140
Upper level trough movement forecasting, 11G–140
Urban air, 11.7–227

van der Pol, B., 11.7–65
Vegetative nervous system, 11.7–106
Venus, 11.7–121
Vertical currents, 11.7–334
Vertical electrical conductivity distribution, 11.7–395
Vertical wind profiles, 11.7–330
Vertical wind shear, 11.7–333
Vertical wind velocity spectra, 11.7–331
Visibility decadence, 11.7–332
Visibility research, 11.7–390
Volcanic effects on earth currents, 11.7–176
Vorticity anomaly forecasting techniques, 11G–146
Vorticity equations, 11G–52

Water balance of soil, 11.7–90
Water supply, 11.7–338
Water supply forecasting, 11G–112
Water table lowering, New Mexico (1948–55), 11.7–219
Water temperatures, 11.7–382
Water vapor divergence calculation, 11.7–337
Water vapor variations, 11.7–362
Wave forecasting, 11G–42
Wave motion, 11.7–278
Weather effects on air pollution, 11.7–227
Weather effects on fishing, 11.7–110
Weather effects on pulmonary embolism, 11.7–103
Weather forecasting, 11G–36, 11G–49, 11G–164
Weather lore, 11G–87
Weather message manuals, 11.7–15, 11.7–16
Weather phenomena, 11.7–71
Weather reconnaissance, 11G–80
Weather types, 11.7–23
Wegener, Alfred, 11.7–66
Weighting of forecasts, 11G–8
Wheat, 11G–128
Wilson chamber, 11.7–137
Wind comparisons, 11.7–312
Wind direction variability, 11.7–313
Wind distribution, 11.7–309
Wind effects on air pollution, 11.7–227
Wind effects on pack ice, 11.7–199
Wind effects on plants, 11.7–42
Wind effects on sand, 11.7–186, 11.7–187
Wind erosion, 11.7–318, 11.7–323
Wind forecasting verification, 11G–129
Wind forecasting errors, 11G–169
Wind machine textbooks, 11.7–10
Wind measurement instruments, 11.7–256
Wind power, 11.7–109
Wind power studies, 11.7–322
Wind power utilization, 11.7–10
Wind shear effects on convective clouds, 11.7–333
Wind speed averaging, 11.7–232
Wind speed estimation, 11.7–250
Wind velocities-pressure field relationships, 11.7–388
Wind waves, 11G–42
Windmills, 11.7–109
Winter wheat cultivation, 11.7–89
World climate coverage, 11.7–46
World climatic atlases, 11.7–294
WMO synoptic guides, 11.7–228

Yearbooks, 11.7–243

Zbara, 11.7–318
Zodiacal light, 11.7–293
Zonal component of motion, 11G–100

INDEX OF GEOGRAPHICAL LOCATIONS

NORTHERN HEMISPHERE, 11.7–326

AFRICA
- **Central Africa,** 11.7–300
- **East African Coast,** 11.7–193

- **Algeria**
  - Tidikelt Oases, 11.7–318
- **Belgian Congo,** *see* **Congo Republic**
- **Congo Republic,** 11.7–17, 11.7–300
- **Egypt,** 11.7–272
- **Federation of Rhodesia and Nyasaland**
  - Nyasaland, 11.7–246
  - Rhodesia, 11.7–246
    - Northern Rhodesia
      - Abercorn, 11.7–351
    - Southern Rhodesia
      - Salisbury Airport, 11.7–78

ASIA
- **Central Asia,** 11.7–75
- **Far East,** 11.7–223, 11G–146

- **China**
  - Tibetan Plateau, 11.7–308
- **India,** 11.7–25, 11.7–322, 11G–107
  - Annamalainager, 11.7–156
  - Kodaikanal, 11.7–153
  - Trivandrum, 11.7–156
- **Iran,** 11.7–4
  - Kuh-i-Savalan, 11.7–225
- **Israel,** 11.7–208, 11.7–350
- **Japan,** 11.7–195, 11.7–282, 11.7–362, 11G–49, 11G–58
  - Hokkaido, 11.7–204
  - Miyazaki Prefecture, 11.7–218
  - Tokyo, 11.7–116, 11G–146
- **Korea,** 11G–80
- **Himalayas**
  - Mt. Everest, 11.7–105
- **Turkey,** 11.7–7
- **U.S.S.R.** (in Asia), *see also* U.S.S.R. *under* Europe, 11.7–368, 11.7–374
  - Amur River, 11.7–374

  - Kazakhstan, 11.7–86, 11.7–87
    - Lake Belkhash, 11.7–348
  - Siberia (Asiatic S.F.S.R.), 11.7–2
    - Altai Territory, 11.7–369
    - Maritime Province, 11.7–214, 11.7–368

AUSTRALASIA
- **Australia,** 11.7–99, 11G–84, 11G–118
  - New South Wales
    - Parkes, 11.7–165
  - Queensland, 11.7–373
  - South Australia, 11G–173
  - Victoria
    - Southern Victoria, 11.7–287
  - Western Australia, 11G–8
- **New Zealand,** 11.7–154, 11G–118
  - Wigram, 11.7–267

EUROPE, 11.7–13
- **Central Europe,** 11.7–360, 11G–155

- **Alps,** 11.7–316
- **Austria,** 11.7–101, 11G–144
- **Baltic Sea,** 11.7–192
- **Belgium**
  - Liége, 11.7–37
- **British Isles,** 11.7–21
  - Great Britain, 11G–153
    - England, 11G–96, 11G–170
      - Farnborough, 11.7–347
      - Kew, 11G–34
        - Kew Observatory, 11.7–244
      - Ternhill, 11.7–332
    - Scotland
      - Aberdeen, 11.7–244
      - Edinburgh, 11G–119
      - Eskadalemuir, 11.7–244
      - Lerwick, 11.7–244
    - Wales, 11G–96
- **Czechoslovakia**
  - Hradec Králové, 11G–145
- **Denmark,** 11.7–109
- **Finland,** 11.7–203, 11.7–375
- **France,** 11.7–245, 11G–142
  - Alès, 11.7–209
  - Ardèche, 11.7–364
  - Cévennes, 11.7–210 to 11.7–213
  - Corsica
    - Bastia, Poretta, 11.7–306
  - Forest of Lyons, 11.7–284
  - French Alps, 11.7–359
  - Hautes-Pyrénées, 11.7–222
  - Paris, 11.7–101, 11.7–270
  - Puy de Dôme Observatory, 11.7–114
  - Saint-Aygulf, 11.7–187
  - Seine River, 11.7–54
  - Trappes, 11.7–324
  - Vosges Mts., 11.7–79
- **Germany,** 11.7–291, 11.7–353, 11G–33, 11G–156
  - Bavaria, 11G–1
    - Arber Mt. (Bohemian Forest), 11.7–356
    - Munich, 11.7–315
  - Northern Germany, 11.7–101, 11.7–312, 11G–120
  - Regen River, 11.7–97
- **Hungary,** 11.7–382, 11G–139
  - Tisza River, 11.7–379
- **Italy,** 11.7–127
  - Catania, 11.7–113
- **Luxembourg,** 11.7–243
- **Netherlands**
  - Gelderse Vallei, 11.7–366
- **Norway**
  - Seiland Island, 11.7–224
  - Skagerrak, 11.7–387
- **Poland,** 11.7–115
  - Biatowieza National Forest, 11.7–94
  - Przemysl, 11.7–349
- **Romania,** 11.7–220
- **Spain**
  - Asturias, 11.7–370
- **Sweden,** 11G–151
  - Stockholm, 11G–119
- **Switzerland**
  - Geneva, 11.7–247
  - Valais, 11.7–345
- **U.S.S.R.** (European and General), 11.7–5, 11.7–38, 11.7–40, 11.7–85, 11.7–145, 11.7–265, 11.7–378, 11.7–381, 11G–33, 11G–162
  - Caspian Sea, 11.7–185
  - European U.S.S.R., 11.7–319, 11G–190
  - Ladoga Lake, 11.7–311
  - Volga River, 11.7–177

  - Azerbaidzhan, 11G–18
    - Kuba-Khachmas range, 11.7–371
  - Georgia, 11.7–47
  - Lithuania, 11.7–389
  - Ukraine, 11.7–89, 11.7–352
  - S.F.S.R.
    - Arkhangelsk, 11.7–73, 11.7–88
    - Caucasus, 11.7–358, 11.7–388
    - Kamennaia Steppe, 11G–20
    - Kola Peninsula, 11.7–130

Leningrad, 11.7–104; 11G–2
Moscow, 11G–138, 11G–164
Novorossisk, 11.7–317
Salsk Steppe, 11.7–321
Yugoslavia
Velika Morava River, 11.7–217
NORTH AMERICA, 11G–137
Canada
Alberta, 11.7–340
New Brunswick
Chatham, 11.7–72
Nova Scotia
Halifax, 11G–131
Quebec
Montreal, 11.7–242
Great Lakes Region, 11G–52
Greenland, 11.7–337
West Indies, 11.7–328
Puerto Rico, 11.7–281
United States, 11.7–14, 11G–30, 11G–33, 11G–67, 11G–83, 11G–99
Eastern United States, 11G–57
Mississippi Basin, 11G–55

Alaska
College, 11.7–141
Elmendorf, 11G–104
Arizona
Tucson, 11.7–288
California, 11.7–100
Northern California, 11G–81
San Diego, 11G–9
San Francisco Airport, 11G–65
Tulare County, 11G–102
Colorado
Denver, 11G–62
Illinois
Chicago, 11G–108, 11G–188
Iowa, 11.7–23
Louisiana
Barksdale Air Force Base, 11G–64
Massachusetts, 11G–45
Cape Cod, 11G–11
Minnesota
Minneapolis, 11.7–146
Montana, 11.7–221
Nebraska, 11.7–286
New Mexico
Animas Valley, 11.7–219
Texas, 11.7–285
Randolph Field, 11G–194
Utah
Great Basin, 11.7–93
Salt Lake City, 11G–69
Virginia, 11.7–355
Washington
Hanford, 11.7–323
Walla Walla, 11G–11
West Virginia
Elkins, 11G–46
Wyoming, 11.7–221
SOUTH AMERICA
Argentina, 11G–73
Peru, 11.7–385
Lima, 11.7–372
OCEANS, SEAS AND ISLANDS
Arctic, 11.7–29, 11.7–30, 11.7–31, 11.7–32, 11.7–33, 11.7–191, 11.7–200, 11.7–313
Antarctic Regions
Antarctic Seas
Davis Sea, 11.7–202
Antarctica, 11.7–34, 11.7–35, 11.7–143, 11.7–199, 11.7–201, 11.7–202
Bunger Oasis, 11.7–36
Byrd Station, 11.7–142
Atlantic, 11.7–395
North Atlantic, 11.7–283, 11.7–344, 11G–63
South Atlantic, 11.7–180
Indian, 11.7–346
Pacific
Bering Sea, 11.7–194
Eastern Pacific, 11.7–14
Okinawa, 11.7–354

SELECT LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or geophysics and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The form of serial entry adopted is given in bold face type below.

Acta Geophysica Polonica, [Warsaw].
Acta Meteorologica Sinica, [Peking].
Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and **Ser. Geofiz.,** [Moscow].
American Geophysical Union, Transactions, [Washington].
American Meteorological Society, Bulletin, [Boston].
Angewandte Meteorologie, [Potsdam].
Annales de Géophysique, Central National de la Recherche Scientifique, [Paris].
Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B, [Vienna].
Australian Journal of Physics, [Melbourne]
Beiträge zur Physik der Atmosphäre, [Frankfurt a. Main].
Ciel et Terre, Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
Geofisica e Meteorologia, Società Italiana di Geofisica, [Genoa].
Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
Geophysical Magazine, Japan Meteorological Agency, [Tokyo].
Hemel en Dampkring, [The Hague].
Időjárás, Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest].
Indian Journal of Meteorology and Geophysics, [Delhi].
Journal de Mécanique et de Physique de l'Atmosphère, Société Météorologique de France.
Journal of Atmospheric and Terrestrial Physics, [London].
Journal of Geophysical Research, [Washington].
Journal of Meteorological Research, [Tokyo].
Journal of Meteorology, American Meteorological Society, [Boston].
The Marine Observer, Air Ministry, Meteorological Office, London.
The Meteorological Magazine, Air Ministry, Meteorological Office, London.
Meteorologické Zprávy [Prague].
Meteorological Society of Japan, Journal, [Tokyo].
La Météorologie, Société Météorologique de France, [Paris].
Meteorologiia i Gidrologiia, [Leningrad].
Meteorologische Rundschau, [Berlin].
Monthly Weather Review, U. S. Weather Bureau, Washington, D. C.
Polarforschung, Archiv für Polarforschung, [Kiel].
Przegląd Geofizyczny, [Warsaw].
Revista de Geofísica, Instituto Nacional de Geofisica, [Madrid].
Rivista di Meteorologia Aeronautica, Servizio Meteorologico, [Rome].
Royal Meteorological Society, Quarterly Journal, [London].
South Africa, Weather Bureau, Notos, [Pretoria].
Tellus, Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Leningrad].
Weather, Royal Meteorological Society, [London].
Weatherwise, American Meteorological Society, [Boston].
Wetter und Leben, Österreichische Gesellschaft für Meteorologie, [Vienna].
WMO Bulletin, World Meteorological Organization, [Geneva].
Zeitschrift für Meteorologie, Meteorologisches Observatorium, Potsdam.

TABLE OF CONTENTS

Meteorological and Geoastrophysical Abstracts, Volume 11, Number 7, July 1960

Foreword ii
Explanations iv

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL GEOPHYSICAL AND ASTROPHYSICAL MATERIAL

General 1009
Major Works 1009
Handbooks-Manuals 1012
Popular Science Books 1014
IGU-Arctic-Antarctic 1015
Conferences-Symposia 1018
Societies-Institutions 1020
Education, History, Biography, etc. 1022
Applications 1028
Aeronautics 1028
Agriculture 1031
Forestry-Fire Weather 1034
Medicine and Health 1037
Industry 1040
Radioactivity 1041
Astronomy and Astrophysics 1043
Astrophysics 1043
Solar Physics 1044
Eclipses 1045
Meteors 1045
Outer Atmosphere 1046
Cosmic and Corpuscular Radiation 1046
Ionosphere 1048
Auroras 1049
Geomagnetism 1052
Radio Astronomy 1055
Astronautics-Satellites 1056
Solid Earth Geophysics 1058
Volcanology 1058
Geomorphology 1059
Oceanography, Hydrology and Glaciology 1059
Oceanography 1059
Sea Ice 1064
Hydrology 1066
Glaciology 1072
Meteorological Observations and Instruments 1073
Synoptic Analysis and Forecasting 1083
Atmospheric Structure and Physics 1084
Dynamics of the Atmosphere 1086
General Circulation 1088
Atmospheric Disturbances 1088
Radiation and Temperature 1091
Soil Temperature 1094
Pressure and Wind 1094
Turbulence 1097
Upper Air Winds 1101
Vertical Motion 1103
Aqueous Vapor, Hydrometeors and Hydrometeorology 1104
Humidity, Condensation, Fog and Cloud 1104
Precipitation, Rain, Snow and Hail 1111
Hydrometeorology 1111
Climatology and Bioclimatology 1111
Climatic Changes 1111
Microclimatology 1111
Bioclimatology 1121
Miscellaneous 1121
Optical Phenomena 1121
Electrical Phenomena 1121
Acoustical Phenomena 1121

PART II. ANNOTATED BIBLIOGRAPHY ON FORECAST VERIFICATION, p. 1129–1174

PART III. TRANSLATIONS, RECENT MONOGRAPHS AND CONTENTS OF RECENT SERIALS AND COLLECTED WORKS, p. 1175–1187

PART IV. AUTHOR AND SUBJECT INDEXES

Index of Authors 1181
Index of Subjects 1191
Index of Geographical Locations 1201
List of Periodicals ..... Cover